

Family Caregiver Resource of Maui County: A Usability Study

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Abstract: Self-care is the active practice of preserving or improving one's health. Family caregivers, usually informal, non-health care professionals caring for a loved one, often overlook self-care while caregiving. Such oversight potentially leads to exhaustion, stress, burnout, and illness. The purpose of this usability study was to create a resource website to curate existing family caregiver resources relevant to caregivers and supporters of cancer patients. Serving the islands of Maui, Molokai, and Lāna'i, the resource site aimed to facilitate connection to local and online family caregiver resources, and reduce online research time for family caregivers, often overwhelmed with responsibilities. A user-centric (U/X) design approach was utilized to design a site responsive to mobile users. The objective of this usability study was to assess the resource site's ease-of-use, the perceived value of the site, and to assess the feelings of user self-efficacy after use of the resource site. Twelve participants assessed the navigability of the site and the value of the content. Verbal feedback from participants during the study and data from post-usability surveys indicated that participants found the responsive site moderately easy to navigate, found high value in the content, and expressed high levels of confidence in understanding self-care after completion of the usability study. (200 words)

Statement of the Problem

Self-Care is Often Overlooked. According to the Oxford Dictionary, self-care is the active practice of preserving or improving one's own health. Family caregivers of cancer patients are often non-health care professionals short on time, involved in varied facets of patient care throughout every phase of the cancer care trajectory, and often fall short in the area of self-care (Given, Given, & Sherwood, 2012). Self-care for family caregivers, though important, is often neglected by caregivers, potentially leading to exhaustion, stress, burnout, and illness. Caregivers often place their self-care needs last and their needs are usually overlooked and not usually assessed in the cancer care trajectory (Girgis & Lambert, 2017; Osse, Vernooij-Dassen, Shade, & Grol, 2006).

Follow-Through is a Challenge. Though caregivers may conduct online research and seek online resources for their beloved with cancer, caregivers tend to be tired, overwhelmed, and experience their own physical, social, and emotional problems in addition to the increase in familial and caregiving responsibilities (Stenberg, Ruland, & Miaskowski, 2010). Hence, caregivers may not follow through with all aspects of self-care or forget to actively seek, then connect with local and online family caregiver resources. In addition,

because there is no end to a caregiver's day, with outside work and caregiving responsibilities, caregivers' resources such as face-to-face support groups may not be convenient to their caregiving schedule or geographic location (Given, et al., 2012).

Usability Study Objective. The objective of the usability study was to assess the ease-of-use of the site in connecting family caregivers in Maui County to local, regional, and national family caregiver resources. The three islands of Maui, Molokai, and Lānaʻi comprise Maui County. A second objective was to build the user's understanding of the importance of self-care when caregiving, as well as improve the awareness of self-care strategies and resources. The resource website intended to facilitate the process of finding local, regional, and national resources on family caregiving and self-care by creating a responsive mobile site design that was user-friendly and consolidated caregiver information relevant to Maui County residents. The examples of research from two eHealth applications, WebChoice and CHESS, served as insight and inspiration for the researcher because both studies demonstrate the utility of an online tool for cancer patients and their family caregivers. However, the scope and depth of developing a similar eHealth application were beyond the time constraints and parameters for this master's project.

Thus the researcher decided to consolidate existing online self-care and family caregivers of cancer patient resources with cancer resources in a responsive site, specific to family caregivers living on the inhabited islands that comprise Maui County: Lānaʻi, Molokai and Maui. The purpose of this usability study was to assess the ease-of-use of the caregiver resource site navigation, ensure there were no critical errors, and assess the feelings of user self-efficacy after using and viewing the site.

Literature Review

The Caregiver Experience. Research on the caregiver experience revealed social isolation brought on by cancer has a considerable impact on both patients' and caregivers' lives: as the disease progresses, caregivers experience diminished access to social supports and an increase in helping the cancer patient manage side effects and symptoms. Diminished social support access and increased caregiving responsibilities impact productivity and energy levels, as well as increase social isolation (Law, Levesque, Lambert, & Girgis, 2018). According to a study by Dębska, Pasek, and Wojtyna, caregivers of cancer patients tend to receive less social support and are less satisfied with the level of support from health care professionals than cancer patients. Less social support and less satisfaction with medical support can lead to an increase in mental, physical, and emotional stress as well as burnout (Dębska, Pasek, & Wojtyna, 2017).

Support Resources for the Caregiver. Informal family caregivers tend to be at risk for inadequate self-care while providing care to cancer patients. Therefore, the investigator wanted to test a possible solution: a responsive site that would inform family caregivers of the importance of self-care and provide resources for balancing caregiving and self-care as outlined by Given et al. (2012).

Mobile Networks, Devices, and Responsive Design. Research of consumer health resources revealed that mobile technology and mobile applications have transformed the way health information is accessed, managed, and delivered. According to Royston, Hagar, Long, McMahon, Pakenham, and Wadhwani, more and more people use a smartphone as their primary point of web access, including for accessing health resources. Mobile networks empower new ways of consumer usage and motivate the development of available mobile services (Royston et al., 2015). There are a plethora of mobile health applications available for download for smartphone operating systems (Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015). As the price point of smartphones declines, and Wi-Fi access points grow in number in urban and suburban areas, more people have mobile Internet access at least intermittently (Silva, et al. 2015; Royston et al. 2015). In consideration of this research and the learner characteristics of the target population, it was important to apply responsive design aspects that cater to the target population who primarily access the Internet via a mobile device.

Mobile Learning. A mobile device was the most common tool of the participants in this usability study. According to Haskell and Schroeder, mobile learning is informal, takes place spontaneously, and is directed by personal inquiry. Mobile learning fulfills a knowledge need that is personal, authentic, and situated within an immediate, need-to-know context. With a mobile device such as a smartphone or tablet, the learner's experience is a continual cycle of inquiry, access, learning, sharing, and reflecting (Haskell & Schroeder, 2011).

The Effectiveness of Online Tools for Supporting Caregivers. Internet eHealth initiatives and mobile devices have become game-changers in recent years for providing timely and convenient support to individuals. This benefit for caregivers should be utilized in order to develop an instructional design-conscious of these elements. A recent study on an eHealth application developed specifically for family caregivers of lung cancer patients found that eHealth interventions may improve caregivers' understanding and coping skills. The web application was found to increase family caregiver confidence in both caregiving and self-care, thus improving the mood and confidence of family caregivers to manage stressors and improve coping skills (DuBenske L., Gustafson, D., Namkoong, K., Hawkins, R., Atwood, A., Brown, R., Chih, M., McTavish, F., Carmack, C., Buss, M., Govindan, R., & Cleary, J., 2014). Another study on a website for breast and prostate cancer patients reported preliminary results of the site's significant contribution to improving patient symptom self-management, symptom distress, quality of life, and emotional well-being (Ruland, C.M., Jeneson, A., Andersen, T., Andersen, R., Slaughter, L., Bente-Schjødt-Osmo, & Moore, S., 2007).

User-Centered Design. The concepts of minimalism combined with rapid prototyping and a user-centered design approach were selected for application to the project. According to Norman, a user-centered design approach is linked to the cognitive domain and based on the premise that designers should design products that are sensitive and responsive to the

needs of the users (Norman, 1982). The responsive principles of user-centered design aligned with the objectives of the project goals: to gain a clear understanding of the users, tasks, and environments in which the resource site would be used; design that is driven by user evaluation; considering the general user experience and involving the client within the design process (Gladkiy, 2018). The design needed to be simple, easy to use, with navigation focused on simplicity and user-friendly interaction.

The Cognitive Domain of Learning. The investigator took into consideration Mayer's Cognitive Theory of Multimedia Learning, that multimedia instructional messages should be designed to guide appropriate cognitive processing during learning without overloading the learner's cognitive system (2014). Clark and Harrelson assert current cognitive learning models are based on the interaction and processes of three memory systems: visual and auditory sensory memories, working or short-term memory, and long-term memory. They emphasize the importance of attention: to stay focused on elements in the environment relevant to learning and to filter out irrelevant elements. Clark and Harrelson suggest designers utilize instructional design techniques that support attention such as cueing devices, arrows, or bolding of text (Clark & Harrelson, 2002). In order to aid the user's attention span, the cueing device suggestions of bolding text, and filtering out irrelevant elements were applied to the site. These techniques helped with the special considerations required when designing for mobile sites, such as potential connectivity and bandwidth issues that require a streamlined, minimalist design (Ho, personal communication, 2019).

Two definitions guided the course of the usability study. Usability is the "extent to which a system, product or service can be used by specified users" to achieve specific goals "with effectiveness, efficiency and satisfaction in a specified context of use" as defined by The International Organization for Standardization (ISO), a worldwide federation of national standards bodies (ISO 9241-11:2018(en) Ergonomics of human-system interaction — Part 11: Usability: Definitions and concepts, 2018). Nielsen defined usability as a quality attribute that assesses how easy user interfaces are to use, and as methods for improving ease-of-use during the design process (Nielsen, 2012).

Methodology

Research Questions and Goals. The purpose of this usability study was to assess the navigational ease-of-use of the caregiver resource site, ensure there were no critical errors, and assess the feelings of user self-efficacy after the use of the site. The intent of the web and mobile site was to be user-friendly, free of critical errors. The mobile interface should link the user to caregiver resources. This usability study will evaluate three areas of inquiry: the clarity of the mobile site's structure, ease of navigation, and usefulness of the mobile site for the user. The usability study consisted of a think-aloud observation protocol with task-based scenarios, an interview or post-observation survey, and a cognitive walkthrough of the prototype (Krug, 2010, 2014). The research questions were:

1. How easy is it for users to navigate the website and find resources or suggested ideas for self-care in their local area?
2. How do users perceive the value of the content and links to external resources of the resource website?

Content Analysis. The Family Caregivers of Maui County site was intended to be a resource site. The goal was to consolidate accessible and relevant self-care resources and self-care support on the Internet in a mobile site to users on the islands of Maui, Molokai, and Lānaʻi. The site was not intended to provide users with medical information per se but to link them to resources available locally and online for family caregivers of cancer patients who are non-health care professionals. At best, the website would increase awareness of the importance of caregiver self-care, and users would assess the value of the content of the website post-usability study.

eHealth Initiatives. Research conducted in recent years of the use of online eHealth strategies demonstrates positive outcomes for family caregivers and cancer patients alike. Website and mobile applications provide users innovative mechanisms to strengthen knowledge and illness management skills and provide both cancer patients and family caregivers with individually tailored, just-in-time information, peer and professional support from their homes at the point and time of need. The examples of research from two applications, WebChoice and CHESS, served as insight and inspiration for the instructional designer because both studies demonstrate the utility of an online tool for cancer patients and their family caregivers (Ruland, et al., 2007; DuBenske et al. 2014).

Connect Available Resources with Family Caregivers. There are many online resources to support family caregivers of cancer patients in Hawaiʻi. Currently, these resources require a user to research to find information on various websites. Due to a variety of reasons such as time constraints, geographic constraints, caregiving, work, and household responsibilities, caregivers are unable to seek and connect with face to face or online caregiver self-care resources even though research shows that interventions have been found to be effective in reducing caregiver burden (Badr & Krebs, 2013). As a bereaved caregiver to a former cancer patient, the investigator understood the demands of caregiving, the importance of self-care, and the reality of seeking self-care resources under time constraints. Also, as a resident of Maui, an island in Maui County, the researcher was aware first hand of the limited cancer resources available to Hawaiʻi residents who do not reside on the island of Oʻahu. Often, neighboring island residents of Hawaiʻi, Kauai, Lānaʻi Maui, and Molokai must travel to Oʻahu or wait for their oncology specialist to visit a neighboring island. The investigator was interested in helping others balance caregiving by curating resources on a simply designed and easy-to-use responsive site in order to connect caregivers with support.

Content Analysis. The content map and wireframe (Appendix A) were examples of rapid prototyping as these were constantly revised as the project advanced and insights were applied. Hence, the original content map and wireframe prototype do not match up with

the site. The content map and wireframe were initially brainstormed to have four sections: Home, Caregiver Self-Care, About, and Finding Support section.

Cognitive Walkthrough Prototypes. Feedback from peers from the Learning Design and Technology (LTEC) online cohort suggested that the “About” section be changed, more information about self-care be included on the landing page, and a section for friends and other family members of primary family caregivers included. The rationale behind the changes was: the “about” section was redundant to the “What is Self-Care?” section, information about self-care should be highlighted first and foremost on the landing page rather than relegated to a subpage requiring more clicks, and that supporters of family caregivers sometimes don’t know how to help even though they want to help. Moreover, feedback from peers in the LTEC cohort promoted a change in the site’s color scheme to an analogous green-blue color scheme rather than the initial wireframe idea of utilizing the island colors of Maui (pink), Molokai (green) and Lāna`i (orange) with white.

Usability Study Prototypes. The initial prototype of the family caregiver website had the title “Maui County Family Caregivers” and contained five content pages: “Home,” “Resources,” “Self Care,” with resources based on Types of Self Care, a “Blog/Forum” and “Contact” (Appendix A). The “Resources” section was divided into local, state, and national resources with hyperlinks that connected the user to external sites. The section “Self-Care” was set up similarly, with resources broken up into four types of self-care, “Physical,” “Emotional,” “Social,” and “Spiritual,” “Bereavement Support,” and “Keiki Support.” Self-care resources listed were hyperlinked to external family caregiver resource sites. The “Blog/Forum” section explained the “why” behind the project and had the potential to nurture a local discussion forum. The “Contact” section allowed visitors to contact the designer with feedback or comments (Appendix K). The initial prototype evolved based on feedback from participants in the three iterations of the usability study.

Recruitment of Participants. Former caregivers of cancer patients or survivors of cancer were chosen as the target audience because these individuals have first-hand experience of the challenges and the strain of family caregiving an individual in active cancer treatment. Twenty potential participants of the target audience, former family caregivers of cancer patients or a supporter of a caregiver, were recruited by a phone call or text message (Appendix B) on the islands of Lāna`i, Maui, and Molokai. Phone calls were the investigator’s first choice and resulted most often in a voice message from the investigator to the potential participant. An alternative initial point of contact was by a text message accompanied by a flyer advertising the study (Appendix B).

In all correspondences, participants were informed of the purpose of the study, participant roles, and responsibilities, as well as informed of the options to opt-out of the study at any time. If the participant expressed interest, an email was sent with an electronic consent form via Google Forms (Appendix E). The electronic consent form outlined the details of the study, the benefits and risks, and a privacy and confidentiality clause. Once the consent form was electronically signed, participants were sent a link to the pre-usability questionnaire in Google Forms (Appendix G). The pre-usability

questionnaire collected demographic information, technical skills, online habits, and self-care habits.

Upon receipt of the completed pre-usability questionnaire, the investigator contacted the participant to schedule the study date, location, and time. Recruitment of target audience participants from the neighboring islands of Molokai and Lānaʻi was difficult, and there were ultimately zero participants from these islands. Recruitment of males was challenging but the investigator was able to recruit three. Though none of the participants were actively caregiving for a cancer patient in treatment, all of the participants were active in caregiving roles for children and/or aging parents, or persons in cancer survivorship.

Twelve participants of various career, educational, and racial/ethnic backgrounds completed the pre-usability questionnaire. However, after the consent form was signed and the pre-questionnaire was completed, one participant decided to opt-out of the study. Eight of the eleven participants were Maui County residents. Nine of the eleven participants fit the target audience of family caregivers or supporters of family caregivers of cancer patients or cancer survivors. Fifty-four percent or six of eleven study participants self-identified as a primary caregiver of a cancer patient at some point in their lives. 27% of participants self-identified as supporters of caregivers, and one of these supporters also identified as a professional health care worker. Round 1 consisted of three participants. Round 2 consisted of four participants, and there were four participants in Round 3. Three of the eleven participants identified their gender as male, and eight of eleven participants identified as female (Appendices I, J).

Of the eleven participants, five completed a high school diploma or General Education Development (GED) tests, two participants had accomplished some college, two participants had accomplished a Bachelor's degree, and two participants had accomplished a Master's degree. Employment status varied, consistent with the broad target audience anticipated by the investigator. Forty-five percent, six of the eleven participants stated they were employed full-time. The investigator counted self-employed as full-time employment. 30% of participants identified as working part-time. One participant identified as a Homemaker. One participant identified as Unemployed. One participant identified as Retired (Appendix J).

Preliminary Questionnaire. After completion of the online consent form, participants completed a preliminary questionnaire prior to viewing the web or mobile site (Appendix G). The pre-survey collected demographic information, technical skills, online habits, and self-care habits. Upon initial viewing and navigation, participants were asked general questions about their initial perceptions of the mobile site in a think-aloud. The participants' voice was recorded along with the screen activities on their mobile device or computer. Participants were asked to give their impressions of the overall design. Specific examples of preliminary questions are in Appendix H.

Task-Based Scenarios. Task-based scenarios were modeled after Krug's guidelines in *Rocket Surgery Made Easy: The Do-It-Yourself Guide to Finding and Fixing Usability Problems* (2010). Subjects were asked to complete seven specific tasks, which helped the instructional designer to identify site learnability issues. The objective of the task-based scenarios was to help determine the overall navigability of the resource website (Appendix H).

Post-Think-Aloud Task-Based Scenarios Interview and Questionnaire. After the completion of the think-aloud observation, participants were interviewed for three to five minutes to gain their overall perspective of the usability satisfaction of the website. The post-usability interview aimed to provide participants an opportunity to candidly share their opinion on the navigability and usefulness of the site, and ask any questions they may have about the study. Participants were then asked to complete a brief anonymous post-survey independently online using their mobile device. The post-survey questionnaire is modeled after a modified version of John Brooke's *System Usability Scale (SUS) - A Quick and Dirty Usability Scale* (1986) and Gregory Davis' *Using a Retrospective Pre-Post Questionnaire to Determine Program Impact* (2003).

Most evaluation instruments including the online consent form, task-based observation sheet, pre- and post-questionnaires were created using Google Forms. Task-based scenarios were typed in Google Docs and emailed to participants after completion of the consent form and pre-usability questionnaires (Appendices G-H). For in-person usability studies, task-based scenarios were printed out in 18-point font and presented to participants on a 5.5 x 8.5-inch cardstock. Participants who completed the study remotely were sent the scenarios via email before the scheduled meeting.

Project Design

Wix web development platform was selected for the development of the website prototype. Selected for its ease of use for web design novices, free of charge, Wix had a plethora of design templates that allowed for the personalized creation of a web and a mobile site. The ability to launch and host a mobile site with the Wix platform ultimately determined platform selection.

The investigator utilized a user-centric design approach, as well as Krug's, *Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability* as a crash course on effective and aesthetically appealing web and mobile site design (Gladkiy, 2018; Krug, 2014). The instructional and visual design strategy was to create effective, clear visual hierarchies for user scanning, not reading (Krug, 2014). Usability testing the site three times allowed the designer to apply the responsive principles of user-centered design such as involving the user in the design process, and evaluation-driven design, and some revision of the original prototype (Gladkiy, 2018).

The Visual Design Elements of simplicity, unity, and color were selected to create a mood of calm (Fulford, 2014). The original prototype consisted of Maui County colors

(orange, pink, green with white), ensuing iterations were created with an analogous green-blue color scheme to create a mood of soothing calm.

Screen Capture Software. A usability protocol for recording both remote and face-to-face mobile usage was utilized in the study to test the ease-of-use of the mobile site by the target audience (Appendix H). For subjects using computers and conferencing remotely, Zoom video conferencing was the preferred computer screen capture software. Most testing was conducted in a face-to-face setting utilizing the participants' mobile devices. For all mobile devices, the mobile sessions were video recorded with an iPhone mounted on a tripod, focused on the subject's hands and the screen of the mobile device.

Procedures. After completion of required CITI Certifications and University of Hawai'i Institutional Review Board (IRB) approval of the study in early Spring Semester 2020 (Appendix D), the investigator conducted three rounds of testing with subjects. Twelve participants electronically signed their consent to participate in the project and returned the form electronically (Appendix G). After completion of the consent form, twelve participants completed a preliminary e-questionnaire prior to scheduling time with the investigator to view the web or mobile site. One participant decided to not continue in the study after completing the pre-survey.

Usability testing was completed one-on-one in person at an agreed meeting place with eleven participants. During the usability tests five participants used their mobile smartphone device, three used a tablet and one participant used a laptop with a touch screen. There were two remote test participants who conferenced with the investigator one-on-one via Zoom video conferencing. Upon initial viewing and navigation, participants were asked to give their impressions of the overall design as well as questions about their initial perceptions of the resource site in a think-aloud. Participants' thoughts were recorded along with the screen activities. The investigator initially took observational notes with pen and paper but soon converted to note-taking using a computer and a spreadsheet that replicated the format of the Task Observation Sheets in a spreadsheet format (Appendix F).

Subjects were asked to complete seven specific tasks, which helped the instructional designer identify site navigability issues. After completion of the think-aloud and tasks, participants were interviewed for three- to five minutes to gain their overall perspective of the website. The post-usability interview aimed to provide participants the opportunity to candidly share their opinion on the navigability and usefulness of the site and ask any questions they may have about the study. To close, subjects were asked to complete a brief anonymous post-survey independently online via Google Forms using their mobile device (Appendices F, G, H).

Results

The purpose of this usability study was to assess the ease-of-use of the caregiver resource site, ensure there were no critical errors, and assess the feelings of user self-efficacy after the use of the site. The objective of the usability study was to assess the ease-of-use of the site in connecting family caregivers to locally available resources, and regional and national resources available online. A second objective was to build the user's understanding of the importance of self-care when caregiving, improve awareness of self-care strategies, in order to build family caregiver confidence in self-care and caregiving. To determine if the study met the research goals, qualitative and quantitative data was collected from a pre-questionnaire, task-based scenarios, interview questions, and a post-questionnaire. Of the eleven usability tests completed, nine were completed face-to-face using a mobile device such as a smartphone (5 of 11), a tablet (3 of 11), or a touch-screen laptop (1 of 11). Two of the usability tests were completed online via Zoom (Appendix J).

Pre-Questionnaire Background on Self-Care and Mobile Device Usage. A quick analysis of the pre-study questionnaire reveals eight of eleven participants expressed “Yes,” they were interested in learning more about family caregiver self-care prior to the usability study. The investigator wanted to understand the participants’ self-perceptions of their own self-care prior to the study. Based on participant self-reporting, the mean score on the self-care questions was about average, around 4. The lowest mean score was the question “**How frequently in a 7-day week do you have time to do something fun or enjoyable just for you?**” The mean score for that question was 3.33 (Table 1).

Table 1

Pre-Usability Questionnaire: Participants’ Self Perceptions of Personal Self-Care

How frequently in a 7-day week do you have time ...

Age	to connect socially to care for your with your personal mental and networks of support?	emotional well-being?	for 15 minutes of physical exercise?	to take 15 minutes of time for yourself during a 7-day week?	to do something fun or enjoyable just for you?
26-35	7	3	7	7	5
36-45	4.5	4.25	4	5.25	4
46-55	3	2.67	2.33	4	1.67
56-65	2	4	4	4	2
66-75	7	7	7	7	5
Grand Total	4.33	4.17	4.33	5.17	3.33

Note. Values represent the mean of a Likert scale: 1= Never, 7 = Always; All Participants in Rounds 1, 2, 3

Of significant note were the lower self-reporting scores from participants in the age group of 46-55. This could be possibly attributed to the stressful family caregiving demands of the sandwich generation, those adults who are caring for both their children and their aging parents (Buck, 2013).

Of the eleven participants who completed the pre-usability questionnaire, seven participants stated they utilize their mobile smartphone as their primary device to access the Internet. As the yellow bars in the graph show, the oldest and youngest/second-youngest participant age groups in the study were the users who exclusively used mobile devices to access the Internet (Figure 1). Participants groups sandwiched in the middle utilized a computer or a tablet device more often. The findings are supported by literature from Silva, Rodrigues, de la Torre Díez, López-Coronado, and Saleem: there is a growing number of eHealth applications available to consumers whose growth is supported by the increased affordability of smartphones and an increase in WiFi hotspots in suburban areas (2015).

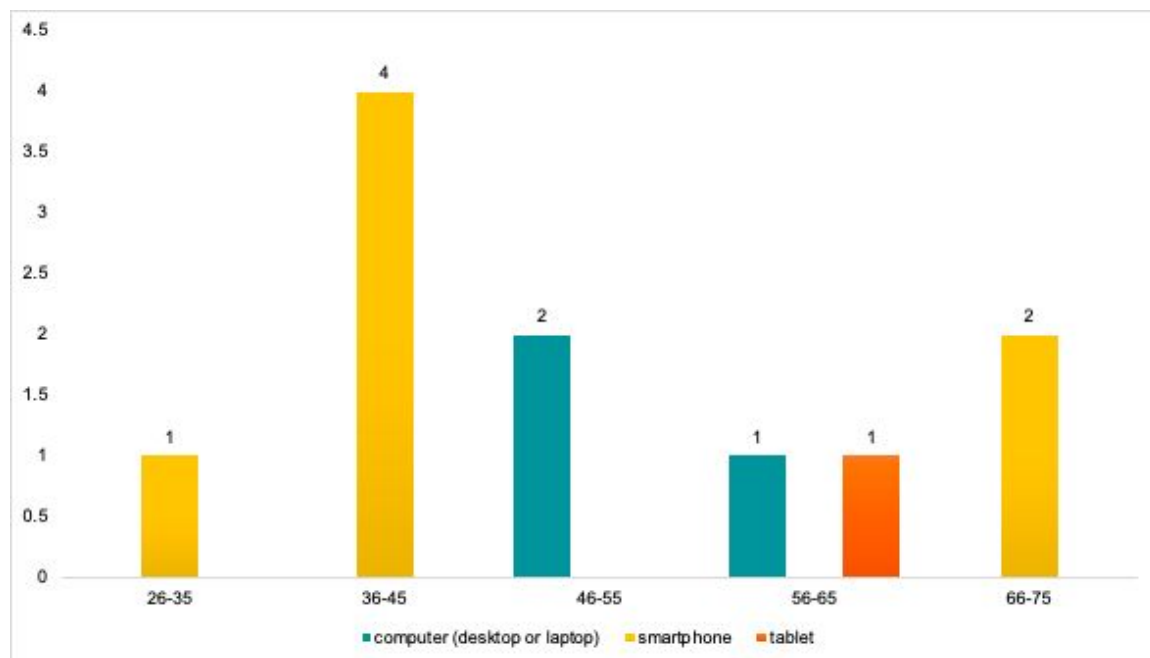


Figure 1. Devices used most regularly when accessing the Internet.

The investigator wanted to understand participants' mobile device usage trends based on self-reporting as based on a Likert scale with 1= never and 7 = always. This information informed the investigator of the users' habits and trends and informed the future iterations. Of interest to the investigator was how often participants utilized their mobile device to access health information via research, or through use of a health application, online. The investigator was also interested in learning from participants how often community-based resources were accessed online. Based on participants' pre-questionnaire responses, the mean score of 5.09 for all iterations demonstrates an above-average use of mobile devices utilized to look up health information on the

Internet. Participants use their mobile devices and possibly use eHealth applications to manage their health. This result supports Haskell and Schroeder's study on mobile learning as fulfilling a knowledge need that is personal, authentic, and situated within an immediate, need-to-know context (Haskell & Schroeder, 2011). However, participant responses in all iterations reported a lower mean when utilizing a mobile device to connect with resources in their community (Table 2). Below average trends could affect the usage of the site by the target audience.

Table 2

When Using a Mobile Device, What Activities Do You Usually Do?

Iteration	Look up health information	Connect with Community Resources
Round 1	5	3.33
Round 2	5.25	4
Round 3	5	4.33
Grand Total	5.09	3.9

Note. Mean of a Likert scale with 1 = Never, 7 = Always

Ease-of-Use and Task-Based Scenarios. All participants in the three iterations performed the same task-based scenarios (See Appendices F, H) to determine navigability of the site. Task difficulty was rated on a scale of 1 (very easy), 2 (somewhat easy), 3 (difficult), 4 (very difficult) by participants. While observing the participants during the usability study, the investigator rated the participants' ability to complete the tasks using a scale to determine the degree of difficulty based on the participant's verbal commentary and observation. The scale used was Task Completed T0 (completed with zero difficulty), T1 (completed task with only minor problem(s), T2 (Participant completed task with more effort/deadends), T3 (Participant didn't complete task). Another rating was added early during Round 1 of usability testing, T& (Task completed in a way differently than the investigator anticipated), because some participants explained how and why they would complete the task the way they did.

The intent of Task 1 was to ensure users understood or familiarized the definition of self-care. Tasks 2, 3, and 7 examined how easy it was for participants to navigate the site and find resources and information based on design and layout. Tasks 4, 5, and 6 intended to determine users' perception of the value of the resource site. However Task 6 was poorly written and was often misinterpreted. Instead it became a way for participants to provide suggestions of other activities not listed on the site, and a way for the investigator to learn of user habits to inform the design iterations.

Nielsen's Severity Rating for Usability Problems (1994) was utilized in the analysis of the usability study. The following 0 to 4 rating scale was used to rate the severity of usability problems: N0 = Investigator doesn't agree that this is a usability problem at all, N1 = Cosmetic problem only: need not be fixed unless extra time is available on project, N2 = Minor usability problem: fixing this should be given low priority, N3 = Major

usability problem: important to fix, so should be given high priority, N4 = Usability catastrophe: imperative to fix this before the product can be released.

Round 1. The active influenza season, combined with caregiving responsibilities of participants, the demands of small business ownership, and other family obligations delayed the completion of Round 1 for two-and-a-half weeks. This reduced the amount of time the researcher had to analyze data from Round 1 and to utilize it to make informed changes and major revisions prior to scheduled times arranged with Round 2 participants. Round 1 participants were extremely helpful in providing anecdotal and observational data that assisted with Nielsen's Severity Rating revisions completed in a short period of time. These revisions ranged from catastrophic to minor. Participants were unclear what was a hyperlink or button and what was just text in the first round. The investigator also reduced the amount of text on the mobile site to short phrases and changed naming conventions in order to ease usability. Participants in Round 1 suggested ideas for improved landing page content. Though most of these improvements qualified as severity rating 2 on Nielsen's Scale, they were easy to complete quickly. Unfortunately, Task 3, (Coordination of Help of Patient Care), the task with the most severe rating of 4 was not a quick fix. The researcher revised the navigation to Task 3, yet as evident in the data of future rounds, the quick fix was not sufficient. Further rounds of testing proved that the changes were not enough. Navigation to complete the task was still a challenge.

Round 2. Participants in this round of testing were super supportive and had a lot to suggest for improvements. All participants in this round had alternative ways to categorize information, including alternative ways to complete the usability tasks. They were willing to search around the website until all options were exhausted, and beyond the investigator's proposal to end the task. A major severity problem discovered in Round 2 was the title of the website in that iteration: Maui County Family Caregivers. One participant stated the name made the website sound like an official county office entity. The researcher didn't want to mislead site users into thinking the site was a county-sponsored site so the issue was flagged as a level 3 severity problem. As a result, the site name was changed. Though participants in Round 2 liked the simplicity of the mobile layout and felt tabs and buttons were clear, there were some broken links that were of level 3 severity due to the hasty smoke test between Round 1 revisions, and Round 2. Task 3 (Coordination of Help of Patient Care) again proved to be a problem of catastrophic severity for two of three participants in Round 2. Even with revision, the coordination resource for online help was buried in a subpage and the naming convention had varied opinions. Participants in Round 2 had lots of ideas for alternative ways to do things, reinforcing the task rating of "T&." Participants reinforced the need for the site to consolidate information for family caregivers and validated the online options of national support groups for locals.

Round 3. Participants in Round 3 expressed their preference to have fewer sub-pages, while still expressing a desire to keep the homepage simple and clutter-free. Round 3 participants expressed the wording of the tasks were unclear, they felt the tasks could have been written more clearly, valuable feedback for building an inclusive site. In this

round, Task 3 again proved to be a catastrophic problem, with 3 of 4 participants unable to complete the task. The investigator found that participants in Round 3 were more upfront than previous participants about stating if an element of the website didn't work for them. This data reveals the need to learn more about the navigation habits and information-seeking behaviors of participants. As well, it shows the value of a diverse participant pool.

Post-Usability Interview. Based on Observations during the usability study, the website URL was difficult for users to find. A number of participants in each round of testing mentioned this in the interview portion of the study, and expressed lament that more people would not have access to the information because of the obscure URL of the site. Participant comments from the interview portion were overall positive. However, two of eleven participants expressed they would probably not use the site. One participant stated that she would rely on seeking recommendations from her doctor and her priest. Nine of eleven said they would use the site and would recommend it to friends and family. Those nine participants also stated they would like to see the resource site information distributed by hospitals, clinics or doctors at the initial cancer support team meeting after diagnosis and before the start of treatment.

Observation and Interview. Mobile site users preferred to scroll and navigate from the homepage rather than navigating to a subpage. This was the researcher's initial design thought as based on research on U/X design, but when designing the homepage, the designer utilized a template that had 4-5 subpages. These subpages were kept in the mobile version, not following the initial scrolling mobile design plan. In all rounds, Task 3 (Coordinating Help) and Task 6 (You have an hour free from caregiving, what would you do?) were more difficult for users to complete the way the investigator anticipated the tasks would be completed, reaching a Nielsen rating of 4 with some participants. Some participants explained how they would complete the task in an alternate way which sounded reasonable to the investigator, and sparked the observation code "T&= Task completed in an alternate way not anticipated by the investigator." Considerations for revision will list the possible changes to correct these problems. In the interview, one participant stated: "To me, I would encourage the people who sat with us [at our initial cancer diagnosis meeting] to tell us hey, by the way, here is a resource for caregivers that would be quick for you to look at" because there isn't one [for family caregivers in Maui County]." Participants in all testing rounds commented about learning of two to three new resources while on the website.

Post-Questionnaire. Figures 2 and 3 show Post-Usability Questionnaire data. For Research Question two, regarding self-efficacy and level of confidence about knowledge of self-care before and after the study, the data reveals eleven of eleven reporting participants strongly agreed they were more confident about their knowledge of self-care after viewing and using the site. This data can be interpreted as use of the site positively contributed to reinforcing caregiver confidence.

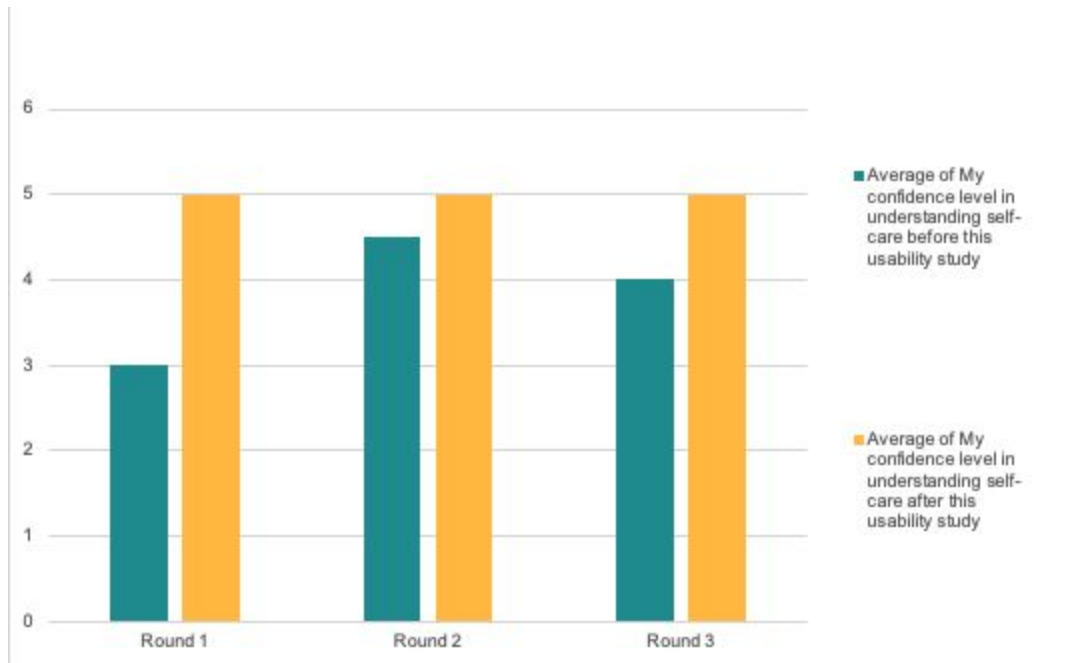


Figure 2. Average of confidence level in understanding self-care.

The remaining three questions of the study's post-survey were concerned with ease of use and perceptions of navigability. The ease of use and navigability was perceived as improved between Round 1 and Round 2 as reported by participants but the gains made were not replicated by participants in Round 3. In particular, the severity of Task 3 throughout the rounds had little improvement even with revisions completed between each round and definitely contributed to the low scores in the yellow "I found what I was looking for" bars on the figure below.

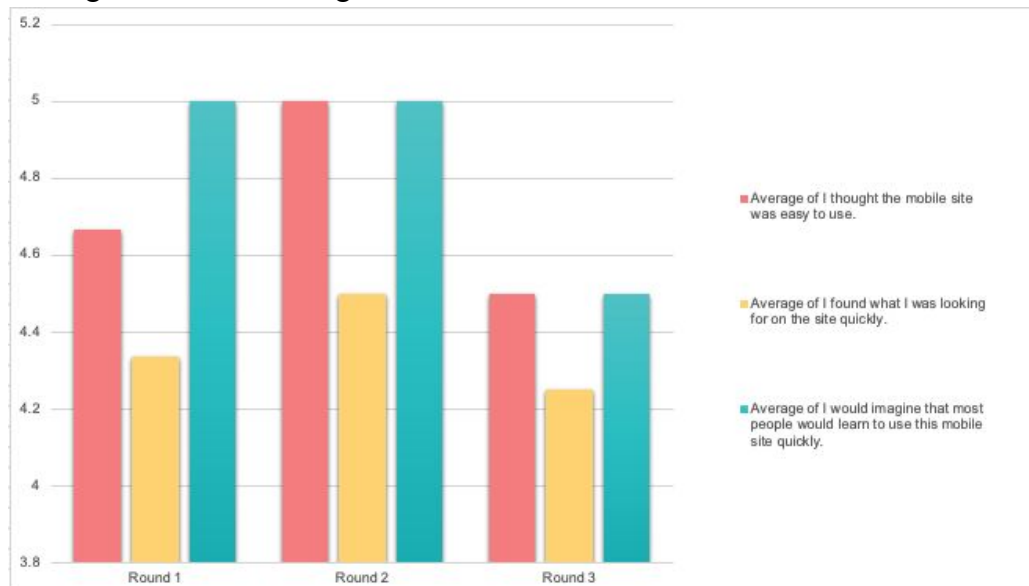


Figure 3. Post-survey ease of use and navigation.

Discussion

The purpose of the project was to facilitate the process of finding local and national resources for caregiver self-care by creating a responsive design that was user-friendly and consolidates caregiver information relevant to family caregivers who reside in Maui County. The designer was sidetracked from the original constant scrolling mobile design by the lure of beautiful, pre-set design templates on the Wix web building platform. Though satisfactory on a desktop or laptop, the current mobile version of the resource site contains more subpages than were originally intended, ironically perpetuating the existing problem on cancer support websites: family caregiver and self-care resources are relegated to sub-pages.

The structure of the resource site was streamlined to include more information and resources about self-care on the landing page and subpages were consolidated to reduce the number of clicks necessary to find self-care and family caregiver resources. However, more improvements can be made if there were future iterations. Participation from Molokai and Lānaʻi were zero percent in this study. This was disappointing for the investigator and makes the study incomplete because for the resource site to be truly for residents of Maui County, perspectives of participants from Molokai and Lānaʻi should be included. To facilitate inclusion, the researcher considered in-person recruitment and 1:1 interviews on Molokai and Lānaʻi islands as a solution.

According to Krug, effective visual hierarchies save site users' work by preprocessing the page, organizing, and prioritizing content in order to be "grasped" instantaneously. Krug argues web pages are scanned, not read, while the user is "on a mission" to get things done quickly. Users are scanning for relevant bits of information that match interests or the task at hand. Instructions are rarely read as users tend to "muddle through" usage effectively but in ways that are nothing like the way the designer intended. This was true for most participants who had creative ways of tasking through the scenarios in ways the investigator had not considered. Breaking up pages into clearly defined areas allows users to focus and quickly decide what info is useful or relevant to them (Krug, 2014). In future iterations, the designer should more effectively apply the principles of visual hierarchies and should consider the further application of effective website design elements as outlined by Garrett, Chiu, Zhang, and Young (2016).

Due to the two-and-a-half week delay in the completion of Round 1, there was a quick turnaround time between all of the rounds which stressed the designer's ability to effectively address catastrophic ratings before the next round of testing began. The Family Caregiver Resource of Maui County needs at least another iteration and another round of usability testing to address the still existing severe and catastrophic errors identified in Rounds 1, 2, 3 with Task 3. Additionally, the resource site would benefit from an adjustment in naming conventions that would be more clear and transparent to Maui County's unique culture. Subpages on the mobile site should be consolidated in order to reduce redundancies and search time. If possible, the investigator would also actively recruit participants earlier in anticipation of unforeseen scheduling conflicts.

Further Study. A broader range of participants should be included in future usability studies and more should be learned about their mobile usage preferences: such as what in a mobile site appeals to participants, and participants' information-seeking practices. Another consideration suggested by numerous participants to integrate a social media or site chat feature to connect local users into a supportive group environment. For further study, the investigator considers reaching out to the local non-profit cancer organizations, hospitals, and clinics here in Maui County in hope of collaboration to improve site content and to advocate for the integration of family caregiver information on their own site. Most importantly would be a collaboration to encourage sharing the compiled resources with families who have just had a cancer diagnosis. Understanding the importance of self-care by family caregivers will hopefully increase awareness of local resources for self-care, thus improving the mood and confidence of family caregivers to manage stressors and improve coping skills.

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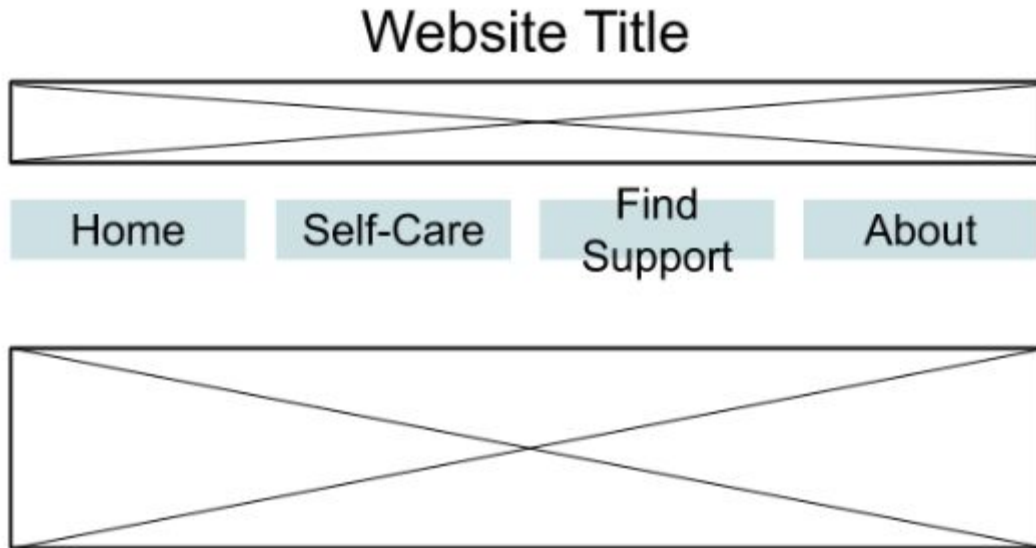
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Appendices

- A. Content Analysis
- B. Recruitment Material
- C. Scripts
- D. CITI Training Certificates
- E. Consent Forms
- F. Data Collection Instruments
- G. Questionnaires
- H. Usability Protocols
- I. Other Files Associated with the Protocol
- J. Data
- K. Screenshots of Project
- L. Explanatory Diagram

APPENDIX A: Content Analysis
(wireframe, hierarchy, outline, content map)

Wireframe Prototype



Mobile Site Wireframe.

Figure 3. Initial website wireframe.

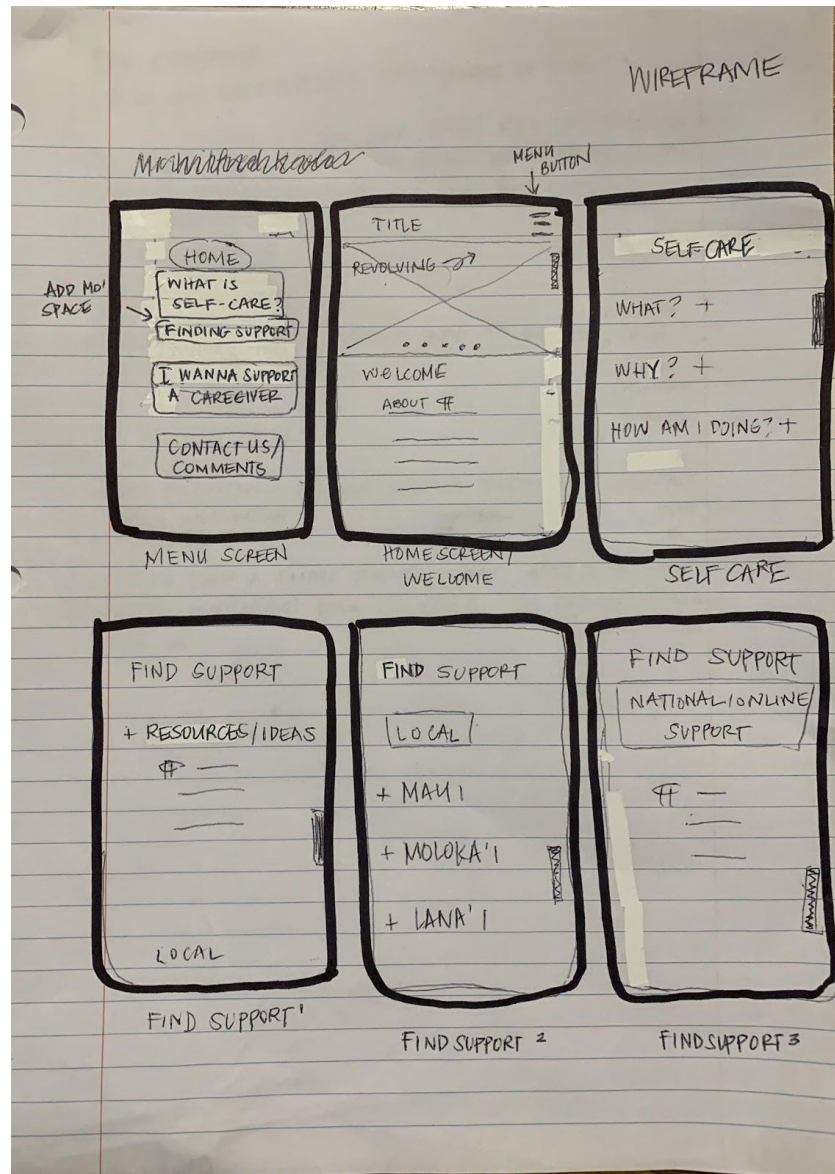


Figure 4. Initial mobile wireframe.

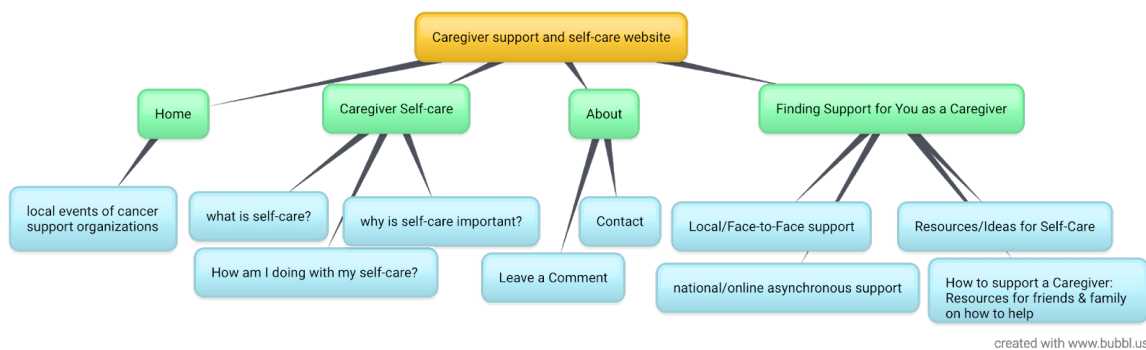


Figure 5. Initial content map.

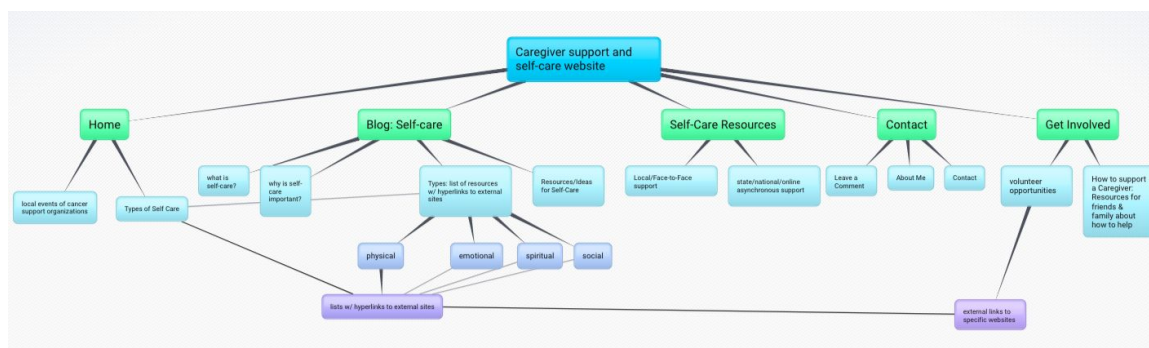


Figure 6. Revised website content map.

APPENDIX B: Recruitment Materials

Recruitment Letter/Email**Evaluating the Usability of a Mobile Site for Cancer Caregivers**

Are you a current or former Caregiver of a Cancer Patient?

Are you interested in learning more about Self-Care?

If you answered YES, your participation is requested for the usability study.

Aloha,

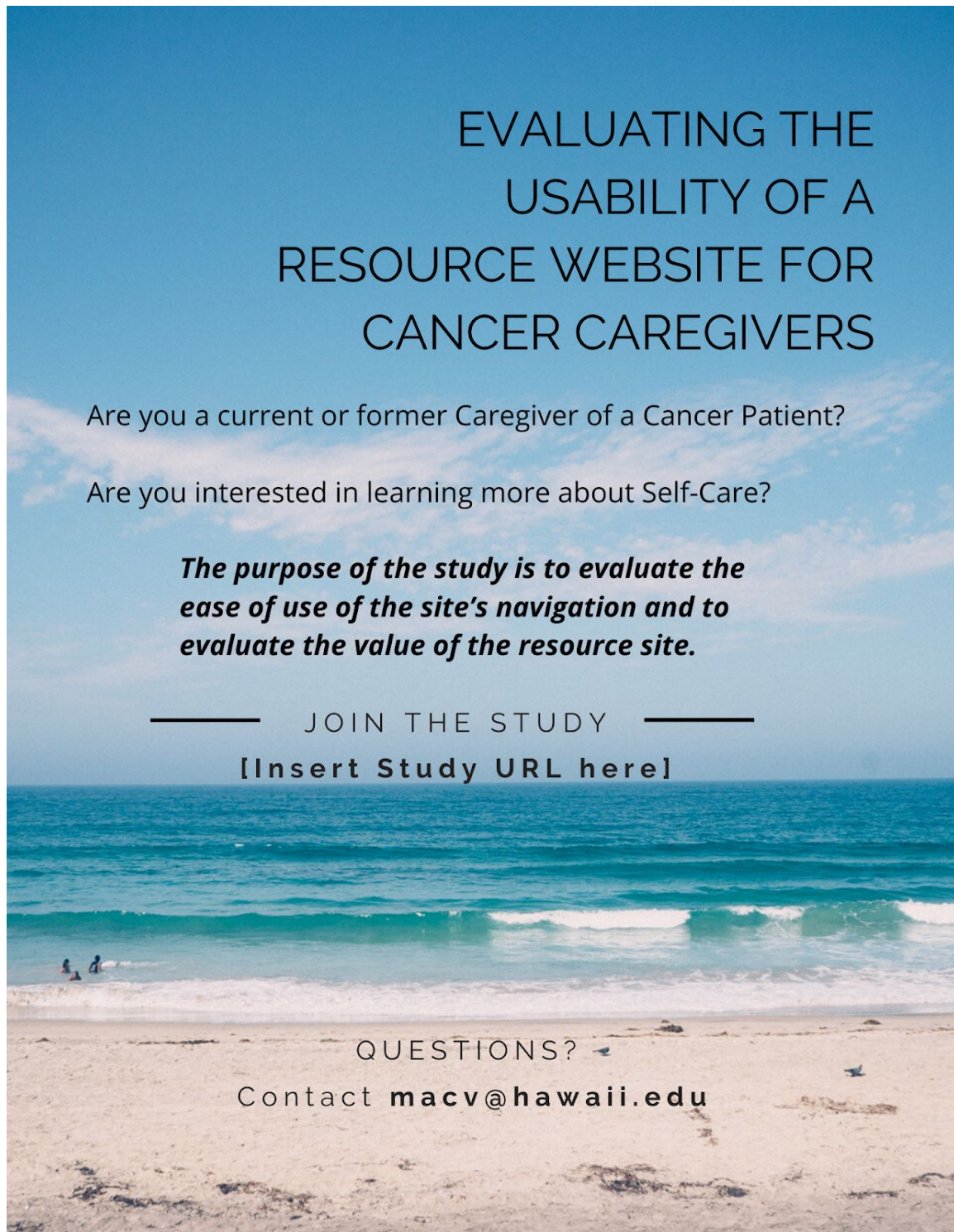
I am Melanie Chan-Vinoray. I'm conducting a mobile site usability study in the College of Education at the University of Hawai'i at Manoa. The purpose of the study is to evaluate the ease of use of the mobile site's navigation and to evaluate the usefulness of the mobile site.

The usability study will take approximately one hour to complete and will be scheduled on a mutually agreed time and location, preferably in person. All participant information will follow strict confidential protocol. Any personally identifiable information collected will not be published. A report of the study will be available to study volunteers.

If you are interested in participating, please click on the link below to review and complete a participation consent form.

If you have any questions, please contact me at macv@hawaii.edu. Mahalo!!

APPENDIX B: Recruitment Materials



EVALUATING THE
USABILITY OF A
RESOURCE WEBSITE FOR
CANCER CAREGIVERS

Are you a current or former Caregiver of a Cancer Patient?

Are you interested in learning more about Self-Care?

The purpose of the study is to evaluate the ease of use of the site's navigation and to evaluate the value of the resource site.

———— JOIN THE STUDY ————
[Insert Study URL here]

QUESTIONS?

Contact **macv@hawaii.edu**

Figure 7. Recruitment flyer.

APPENDIX C: Recruitment Materials


Recruitment Phone Script

Aloha,

This is Melanie Chan-Vinoray. I'm calling to see if you are interested in participating in a usability study of a mobile website. The purpose of the study is to evaluate the usability of a mobile site for current and former caregivers of cancer patients and survivors. The study will take approximately one hour and can be conducted at a time and place convenient to you. Any personal identifiable information collected will not be published and you can quit the study at any time.

I am conducting the study as part of my graduate project at the University of Hawai'i at Manoa in the College of Education. Your participation will be greatly appreciated. If you have questions, you can reach me via email at macv@hawaii.edu. Thank you for your consideration!

APPENDIX D. CITI Training Certificates

		Completion Date 25-Mar-2019 Expiration Date 24-Mar-2022 Record ID 31031971
This is to certify that:		
Melanie Chan-Vinoray		
Has completed the following CITI Program course:		
Human Subjects Research (HSR)	(Curriculum Group)	
Exempt Researchers and Key Personnel	(Course Learner Group)	
1 - Basic Course	(Stage)	
Under requirements set by:		
University of Hawaii		
 Collaborative Institutional Training Initiative		
Verify at www.citiprogram.org/verify/?w0506df6e-ef7b-46dd-9d5c-17b7bfe4d3f0-31031971		

		Completion Date 26-Mar-2019 Expiration Date 25-Mar-2022 Record ID 31031970
This is to certify that:		
Melanie Chan-Vinoray		
Has completed the following CITI Program course:		
Information Privacy Security (IPS)	(Curriculum Group)	
Exempt Researchers and Key Personnel IPS	(Course Learner Group)	
1 - Basic Course	(Stage)	
Under requirements set by:		
University of Hawaii		
 Collaborative Institutional Training Initiative		
Verify at www.citiprogram.org/verify/?w59a78054-8d51-487d-9ae3-c89ea8c9388a-31031970		

APPENDIX E.

Consent Form to Participate in a Research Project

Melanie Chan-Vinoray, Principal Investigator

*Project title: Family Caregiver Resource of Maui County: A Usability Study*Electronic Form: <https://forms.gle/UHm8rAJ5yUS5v4ru7>

Aloha!

I am Melanie Chan-Vinoray and you are invited to take part in a research study. I'm a graduate student in the College of Education at the University of Hawai'i, Manoa campus. As part of my graduation requirement to earn a graduate degree in Learning Design and Technology, I am doing a research project.

If you choose to participate in this project, I would like to meet with you for a one-on-one usability assessment of the mobile site at a time and location convenient for you. I will work to arrange a convenient meeting location for you.

Taking part in this study is your choice.

Your participation in this project is completely voluntary. You may stop participating at any time. If you stop your participation in the study, there is no penalty or loss to you.

Why is this study being done?

The purpose of this study is to evaluate the ease-of-use of navigation on a mobile site for caregivers of cancer patients. The web and mobile site should be user-friendly, free of critical errors and the web and mobile interface should link the user to caregiver resources in Maui County, Hawai'i. I am asking you to participate because you have identified as a current or former caregiver of a cancer patient or cancer survivor.

What will happen if I decide to take part in this study?

First, you will be asked to complete a pre-usability questionnaire that will consist of demographic information, Internet and technology usage, and self-care practices. Some examples of questions are: "How old are you?, Which technology device do you use the most?, How frequently in a seven-day week do you have time to do something fun or enjoyable just for you?"

Next, upon completion of the questionnaire, you will be contacted to schedule a one-hour session at a time and place convenient to you. The session will consist of 15-20 open-ended preliminary questions, tasks and interview questions.

The session will be scheduled at a time and place that is convenient for you. Only you and I will be present during the session interview. With your permission, I would like to video-record and audio-record the session so that I can later transcribe the interview, analyze the initial responses to the use of the mobile site and navigation within the mobile site. Your face will not be recorded, only your hands, voice and the screen of your mobile device.

What are the risks and benefits of taking part in this study?

There is little risk to you if you choose to participate in the research project. Participation in the study is completely voluntary. The potential risk of the study may be stress or anxiety in accessing a web resource and completing task-based scenarios on a mobile device. Another potential risk of the study is that you may become uncomfortable in discussing or recalling the intensity of a time period of caregiving for a cancer patient or survivor. You can also stop taking the survey or you can withdraw from the project altogether.

There will be no direct benefit for your participation in this usability study; however, the potential benefit for you is that it may increase your awareness of strategies for, and resources available to you for self-care in the Maui County area of the state of Hawai'i.

Privacy and Confidentiality

I will not ask you for any personal information, such as your name or address. Please do not include any personal information in your survey responses. I will keep all study data secure and encrypted on a password-protected computer. Only my University of Hawai'i advisor and I will have access to the information. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

After I transcribe the session, I will erase or destroy the audio and video recordings. When I report the results of my research project, I will not use any personal identifying information that can identify you.

Future Research Studies

Identifiers will be removed from your identifiable private information. The data from this study will not be used or distributed for future research studies.

Questions

If you have any questions about this study, please email me at macv@hawaii.edu. You may also contact the UH Human Studies program at 808.956.5007 or uhirb@hawaii.edu to discuss problems, concerns, and questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/jRd> for more information on your rights as a research participant.

If you agree to participate in this project, please sign and date this signature page and return it to: Melanie Chan-Vinoray, macv@hawaii.edu

Please request a digital copy of your response via Google Forms

Signature(s) for Consent:

I give permission to join the research project entitled, “Self-Care for the Caregiver: A Usability Study on a Resource Website for Family Caregivers of Cancer Patients and Survivors.”

Please initial next to either “Yes” or “No” to the following:

_____ ***Yes*** _____ ***No*** *I consent to be audio-recorded for the interview portion of this research.*

_____ ***Yes*** _____ ***No*** *I consent to being video-recorded for the interview portion of this research.*

Please digitally sign this form by typing your name below.

Name of Participant (Print): _____

Signature of the Person Obtaining Consent: _____

Date: _____

Mahalo nui loa, thank you very much for your willingness and participation in this research project.

APPENDIX F. Data Collection Sheets

Think Aloud & Usability Task Data Collection Sheet

(Note: Observation & Data Collection Instruments initially started as Google Docs but converted to Google Sheets during active data collection for ease of data management)

Test Facilitator: _____ Test Date: _____

Test Subject #: _____ Test Location: _____

Think Aloud Guiding Questions

1. What are your first impressions of the mobile website?

2. What information do you think you can get from this mobile site?

3. Who is the mobile site designed for?

4. What do you think people can do on the mobile site?

5. What are your initial thoughts on the mobile layout? Color? Graphics and Photos?

Usability Task Worksheet

Task 1:

- You are a primary caregiver of a person in active cancer treatment. Your beloved's oncology team has suggested you look into self-care strategies to help you as you give care, but you're not sure what they mean by self-care.

Participant's Response:

Facilitator will ask:

1. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
2. *Is the information you found adequate?* ☐ YES ☐ NO
3. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

Task 2:

- You are a caregiver of a person in active cancer treatment. You heard there are caregiver support group meetings held on Maui and would like more information.

Participant's Response:

Facilitator will ask:

1. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
2. *Is the information you found adequate?* ☐ YES ☐ NO
3. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

Usability Task Worksheet

Task 3:

- You are a primary caregiver of a person in active cancer treatment. You need help coordinating online communication updates and caregiving tasks for your family and friends.

Participant's Response:

Facilitator will ask:

1. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
2. *Is the information you found adequate?* ☐ YES ☐ NO
3. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

Task 4:

- You are a bereaved former caregiver. You want to connect to other bereaved caregivers who can understand how you feel.

Participant's Response:

Facilitator will ask:

1. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
2. *Is the information you found adequate?* ☐ YES ☐ NO
3. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

Usability Task Worksheet

Task 5:

- You are a supporter of a primary caregiver. You want to support and help your friend or family but don't know how.

Participant's Response:

Facilitator will ask:

4. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
5. *Is the information you found adequate?* ☐ YES ☐ NO
6. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

Task 6:

- You are a primary caregiver of a person in active cancer treatment. Your support team has stepped up to help with caregiving, leaving you with some free time for yourself. What do you want to do for an hour?

Participant's Response:

Facilitator will ask:

7. *Do you think you found the information that you're looking for?* ☐ YES ☐ NO
8. *Is the information you found adequate?* ☐ YES ☐ NO
9. *Please rate the level of finding the information:*
☐ 1 = very easy ☐ 2 = somewhat easy ☐ 3 = difficult

APPENDIX F. Data Collection Sheets
List of Problems with Severity Scale

(Note: Observation & Data Collection Instruments initially started as Google Docs but converted to Google Sheets during active data collection for ease of data management)

Nielsen's (1994) 5-level Scale for Usability Problem Severity

0 = I don't agree that this is a usability problem at all

1 = Cosmetic problem only: need not be fixed unless extra time is available on project

2 = Minor usability problem: fixing this should be given low priority

3 = Major usability problem: important to fix, so should be given high priority

4 = Usability catastrophe: imperative to fix this before product can be released

ID	Problem Description	Ref.	Severity	Reason For Rating
Task 1				
Task 2				
Task 3				
Task 4				
Task 5				
Task 6				
Other				

*Reference: when/where the problem is identified.

L = literature review

O = observation

I = interview

S = survey

APPENDIX F. Data Collection Sheets
List of Recommended Changes

(Note: Observation & Data Collection Instruments initially started as Google Docs but converted to Google Sheets during active data collection for ease of data management)

List of Recommended Changes

Problem # 1:

Recommended Changes:

Problem # 2:

Recommended Changes:

Problem # 3:

Recommended Changes:

APPENDIX G. Questionnaires
Pre-Usability Interview Online Questionnaire

URL: <https://forms.gle/1hQZDP32RTw1dsJv5>

Section 1: Introduction

Aloha,

Thank you for completing the consent form and for volunteering for this research study. Prior to our one-on-one usability interview session, please complete this short online questionnaire of general demographic information, Internet, information, communication and technology usage and current self-care practices. It will take about 10 to 15 minutes to complete a total of 18 questions. Your information will be kept anonymous and confidential, will only be used for the duration of this study, then destroyed. Your participation is voluntary. You can stop at any time if you don't feel comfortable at no penalty to you. Mahalo,
Melanie

Section 2: Self-Care Practices

1. How often are you able to take time (15+ minutes) for yourself during the week?
 - (Likert) 1-Never → 7-Always
2. How frequently in a seven-day week do you have time to do something fun or enjoyable just for you?
 - (Likert) 1-Never → 7-Always
3. How frequently in a seven-day week do you have time for +15 minutes of physical exercise?
 - (Likert) 1-Never → 7-Always
4. How frequently in a seven-day week do you have time to care for your mental and emotional well-being?
 - (Likert) 1-Never → 7-Always
5. How frequently in a seven day week do you have time to connect socially with your personal networks of support?
 - (Likert) 1-Never → 7-Always
6. Do you have any personal health concerns that you worry about?
 - Y/N
 - If Yes, would you like to specify? (*Write in blank*) _____
7. Are you interested in learning about balancing caregiving and self-care?
 - Yes
 - No

APPENDIX G. Questionnaires
Pre-Usability Interview Online Questionnaire

Section 3: Information and Communication Technology Usage

8. Do you have a...?

Select all that apply:

- ☐ smartphone
- ☐ tablet
- ☐ computer

9. Which device do you use most regularly when accessing the Internet?

- ☐ Smartphone
- ☐ Tablet
- ☐ Computer (desktop or laptop)

10. When using a mobile device, what activities do you usually do? (Check all that apply) (Likert scale for each?) 1-Never → 7-Always

- ☐ Email
 - i. 1-Never → 7-Always
- ☐ Personal planning & management (calendaring/scheduling/finance/health apps)
 - i. 1-Never → 7-Always
- ☐ Social media
 - i. 1-Never → 7-Always
- ☐ Look up Health information
 - i. 1-Never → 7-Always
- ☐ Connect with Community Resources
 - i. 1-Never → 7-Always
- ☐ News
 - i. 1-Never → 7-Always
- ☐ Entertainment/Games (including sports app, video apps, game apps, shows & movies)
 - i. 1-Never → 7-Always
- ☐ Search for tips, information/Research
 - i. 1-Never → 7-Always
- ☐ Phone calls & Texting
 - i. 1-Never → 7-Always
- ☐ Shopping
 - i. 1-Never → 7-Always
- ☐ Other: _____

APPENDIX G. Questionnaires
Pre-Usability Interview Online Questionnaire

11. How frequently do you use a mobile application--such as a calendar, health app, social media app, spiritual guidance app, financial app, et. cetera--to manage parts of your life?
- (Likert) 1-Never → 7-Always
12. The best way to contact you?
- Phone call & Voicemail
 - Text message
 - Via a Social Media app (Facebook Messenger, Instagram, Snapchat, etc.)
 - Email

Section 4: Demographics

13. Your age is...
- 18-25
 - 26-35
 - 36-45
 - 46-55
 - 56-65
 - 66-75
 - 76 +
14. Your gender...
- Male
 - Female
 - Transgender
 - Non-Binary
 - Prefer Not to State
15. How you identify your race/ethnicity...
- African American/Black
 - Asian/Pacific Islander
 - Caucasian
 - Hispanic/Latin@
 - Native American/Native Hawaiian/American Indian
 - Multiracial/Multiethnic
 - Other: *please specify* _____
 - Prefer Not to State
16. Your current caregiving status...
- Please select the statement that best describes you:*
- I currently am a primary caregiver for a cancer patient
 - I was a primary caregiver for a cancer patient or cancer survivor during a period of my life
 - I support or have supported a primary caregiver and am NOT a professional health care provider/worker
 -

APPENDIX G. Questionnaires
Pre-Usability Interview Online Questionnaire

- I support or have supported a primary caregiver and am a professional health care provider/worker
- No, I have not been a caregiver for a cancer patient and I do not identify with any of the above statements.

17. Which of the following best describes your highest formal education accomplishment? *(If currently enrolled, highest level completed)*

- Some high school, no diploma
- High school diploma or equivalent (e.g. GED)
- Some college, no degree
- Associate's degree
- Bachelor's degree
- Professional Certificate
- Trade/Technical/Vocational Training and Apprenticeship
- Master's degree
- Doctorate degree

18. Which of the following best describes your current employment status? *(Select all that apply)*

- Employed - Part-time
- Employed - Full-time
- Homemaker
- Student
- Unemployed

---End of Pre-Usability Interview Online Questionnaire---

---press submit to record answers---

--Post-Submission message:

Thank you for your anonymous submission and participation in the study. I will follow up with you to schedule the mobile site evaluation session at a time and place convenient for you. The session will take about 45 minutes to complete. It includes preliminary questions, task-based scenarios using the mobile site, a brief interview to end the mobile site evaluation session and if you choose to utilize the moment, time to individually complete a brief post-questionnaire.

APPENDIX G. Questionnaires
Post-Usability Study Survey

URL: <https://forms.gle/wVpgPvngP3vEEqVZA>

Introduction

Thank you very much for participating in this research study. Please complete this post-usability study survey. It will take about 5 minutes to complete a total of 6 questions. Your information will be kept anonymous and confidential, will only be used for the duration of this study, then destroyed. Your participation is voluntary. You can stop at any time if you don't feel comfortable at no penalty to you.

Retrospective Pre-/Post-Survey From class notes presentation week 6, and Davis, G. (2003)

1. My confidence level in understanding self-care before this usability study
 - (Likert) 1- very low → 5-very high
2. My confidence level in understanding self-care after this usability study
 - (Likert) 1- very low → 5-very high

from Brooks, J. (1986). SUS

https://cui.unige.ch/isi/icle-wiki/_media/ipm:test-suschapt.pdf

3. I thought the mobile site was easy to use.
 - (Likert) 1- very low → 5-very high
4. I think I would use this mobile site frequently.
 - (Likert) 1- very low → 5-very high
5. I found what I was looking for on the site quickly.
 - (Likert) 1- very low → 5-very high
6. I would imagine that most people would learn to use this mobile site quickly.
 - (Likert) 1- very low → 5-very high
7. The information on the mobile site was useful and valuable.
 - (Likert) 1- very low → 5-very high

---End of Post-Usability Study Online Questionnaire---

---press submit to record answers---

--Post-Submission message:

Thank you for your anonymous submission and participation in the study. This is the end of the usability research study.

APPENDIX H. Protocols (Usability Scripts)
Usability Protocol with Preliminary Questions and Task-Based Scenarios

Script adapted from Krug, Steve. Rocket Surgery Made Easy (Voices That Matter) (p. 147-153). Pearson Education. Kindle Edition.

MOBILE SITE URL: <https://macv127.wixsite.com/mauicaregiversupport>

Introduction

Hi, _____. My name is Melanie, and I'm going to be walking you through this session today. Before we begin, I have some information for you, and I'm going to read it to make sure that I cover everything.

You probably already have a good idea of why I asked you here, but let me go over it again briefly. I'm asking people to try using a mobile web site that I'm working on so I can see whether it works as intended. The session should take about an hour.

The first thing I want to make clear is that we're testing the site, not you. You can't do anything wrong here. In fact, this is probably the one place today where you don't have to worry about making mistakes. As you use the mobile site, I'm going to ask you as much as possible to try to think out loud: to say what you're looking at, what you're trying to do, and what you're thinking. This will be a big help to me. Also, please don't worry that you're going to hurt my feelings. I'm doing this to improve the site, so I need to hear your honest reactions.

If you have any questions as we go along, just ask them. I may not be able to answer them right away since I'm interested in how people do when they don't have someone sitting next to them to help. But if you still have any questions when we're done, I'll try to answer them then. And if you need to take a break at any point, just let me know. You may have noticed the microphone and a tablet set up on a tripod. With your permission, I'm going to audio and video record what happens on the screen of your mobile device and our conversation. The recording will only be used to help me figure out how to improve the site, and it won't be seen by anyone except the people working on this project. And it helps me because I don't have to take as many notes.

First, I'm going to have you review your consent form to ensure that everything is in order. Please take a look at it now and review your consent.

[START THE RECORDING NOW]

Do you have any questions?

The usability study has three parts: Preliminary Questions, Task-Based Scenarios and a brief interview after the scenario tasks. The purpose of the preliminary questions is to collect your first impression on the mobile site prior to the task portion of the session. Your comments are very valuable for this study. This should take no more than 5 minutes to complete. Your responses are confidential and will only be used for research purposes only. You can stop answering the questions at any time if you do not feel comfortable. Any questions?

Preliminary Questions

While you look at the mobile site, I would like you to share your thoughts aloud with me. I will ask you at times, “What are you thinking?” Just share exactly what it is you’re thinking.

First, I’m going to ask you to look at the mobile site and tell me what you make of it, what strikes you about it, whose site you think it is, what you can do here, and what it’s for. You can scroll if you want to, but don’t click on anything yet. Just look around and do a little think-aloud narrative.

- 1. What are your first impressions of the mobile website?**
- 2. What information do you think you can get from this mobile site?**
- 3. Who is the mobile site designed for?**
- 4. What do you think people can do on the mobile site?**
- 5. What are your initial thoughts on the mobile layout? Color? Graphics and Photos?**

CONTINUE FOR 3-4 MINUTES.

Thanks. That was great! Now I’m going to ask you to try doing some specific tasks. I’m going to read each one out loud and give you a printed copy. I’m also going to ask you to do these tasks without using Search. I’ll learn a lot more about how well the site works that way. And again, as much as possible, it will help me if you can try to think out loud as you go along.

Task-Based Scenarios

- Hand the participant the first scenario, and read it aloud.
- Allow the user to proceed until it’s NOT producing any value or the user becomes very frustrated.
- Repeat for each task or until time runs out.

Krug, Steve. *Rocket Surgery Made Easy (Voices That Matter)* (pp. 151-152). Pearson Education. Kindle Edition.

- ➔ You are a primary caregiver of a person in active cancer treatment. Your beloved's oncology team has suggested you look into self-care strategies to help you as you give care, but you're not sure what they mean by self-care.
- ➔ You are a caregiver of a person in active cancer treatment. You heard there are caregiver support group meetings held on Maui and would like more information.
- ➔ You are a primary caregiver of a person in active cancer treatment. You need help coordinating online communication updates and caregiving tasks for your family and friends.
- ➔ You are a bereaved former caregiver. You want to connect to other bereaved caregivers who can understand how you feel.
- ➔ You are a supporter of a primary caregiver. You want to support and help your friend or family but don't know how.
- ➔ You are a primary caregiver of a person in active cancer treatment. Your support team has stepped up to help with caregiving, leaving you with some free time for yourself. What do you want to do for an hour?

THANK YOU _____, that was very helpful.

Post Usability Protocol Interview Question

- Do you have any questions or comments that you would like to share?
- What did you like best about the mobile site?
- What did you least like about the mobile site?
- Would you recommend this site to any of your friends and family?
- Any other comments? Questions?

Thank you for participating in my usability research study. Before you go, if you could use your mobile device and take five minutes to complete an anonymous online questionnaire independently by yourself, I greatly appreciate it!

APPENDIX I. Other Files Associated with the Protocol

[TCC 2020 Presentation](#)

Figure 8. Participant comments regarding the resource site.

APPENDIX J. Data

Table 3

Raw Data Bird's Eye View of Data - Initial Interpretation

Research question	Data Collected	Initial Interpretation
R1 (navigation: ease of use)	Pre-questionnaire	Of the n=11 participants, 63% regularly use a smartphone to access the Internet
	Observation	Website URL was hard to find, but once found, participants used & found information. Some specific tasks were moderate to difficult to find info. Mobile site users preferred to scroll on the homepage rather than navigating to subpages.
	Interview	easy to access a lot of “valuable information and resources”. “A needed resource for outer islands and caregivers starting their journey.”
R2 (attitude: perceived value)	Pre-questionnaire	Of n =11, 72% were interested in learning more about self-care resources and information
	post-questionnaire	Overwhelmingly, participants found the information on the site valuable n= 11/11
	Interview	mostly positive, participants would make recommendations to others, and implementation

Table 4

Participant Age, Education Level, Employment Caregiver Status, n = 11

	Characteristics	Number	Percent
<i>Age</i>	26-36	1	9%
	36-45	4	36%
	46-55	2	18%
	56-65	2	18%
	66-75	2	18%
<i>Education</i>	High School Diploma	5	45%
	Some College	2	18%
	Bachelor's Degree	2	18%
	Master's Degree	2	18%
<i>Employment</i>	Full-Time	4	36%
	Part-Time	3	27%
	Self-Employed'	1	9%
	Retired	1	9%
	Homemaker	1	9%

Table 5

Device You Use Most Regularly When Accessing the Internet? n = 11

Device	26-35	36-45	46-55	56-65	66-75	Grand Total
Computer (desktop or laptop)			2	1		3
Smartphone	1	4			2	7
Tablet				1		1
Grand Total	1	4	2	2	2	11

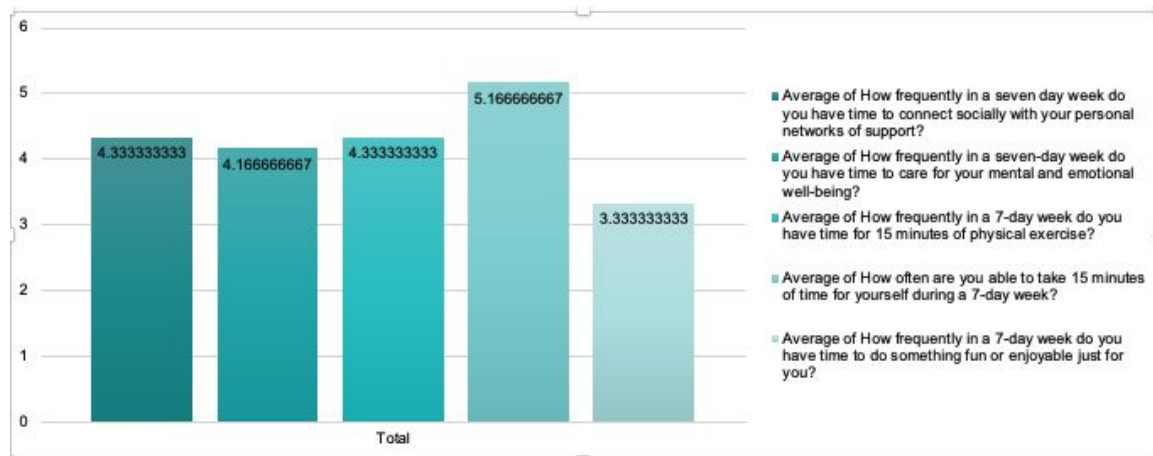


Figure 9. Average of participant self-reporting of self-care, n = 11. Likert scale, 1 = never, 7 = always

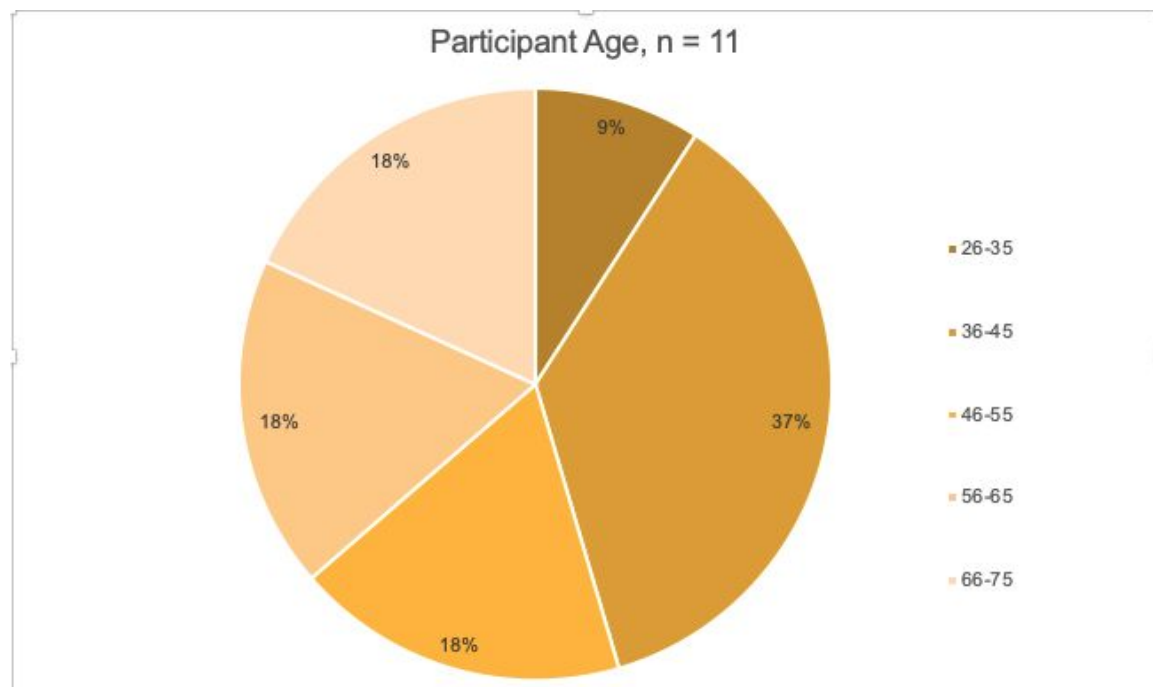


Figure 10. Participant age, n= 11

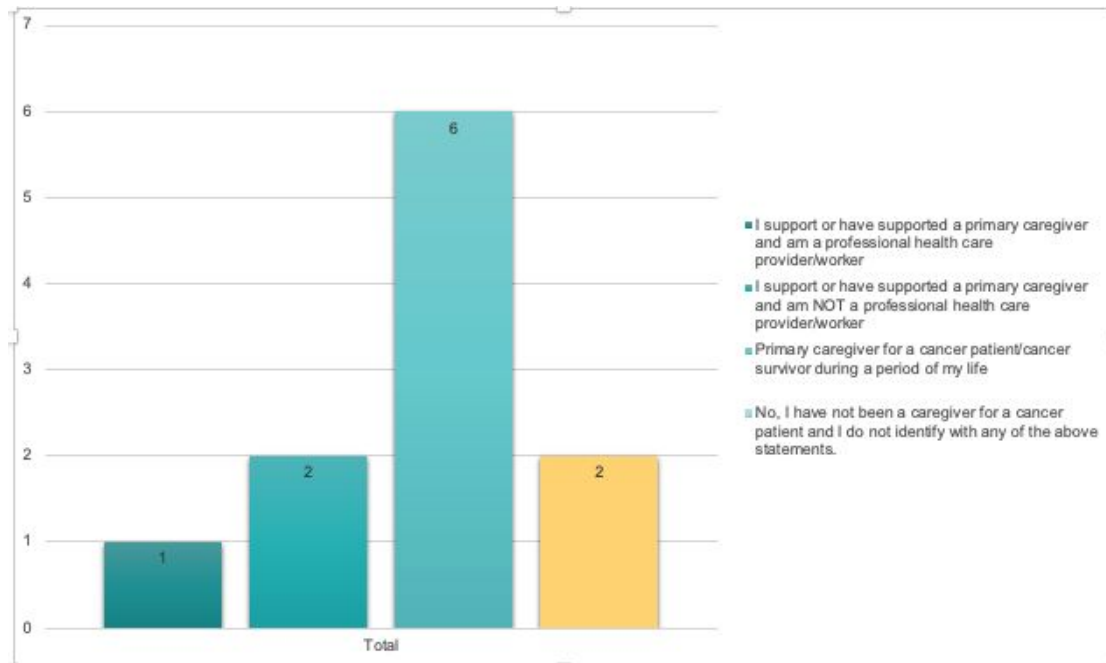


Figure 11. Participant self-identification of caregiver experience, n = 11.

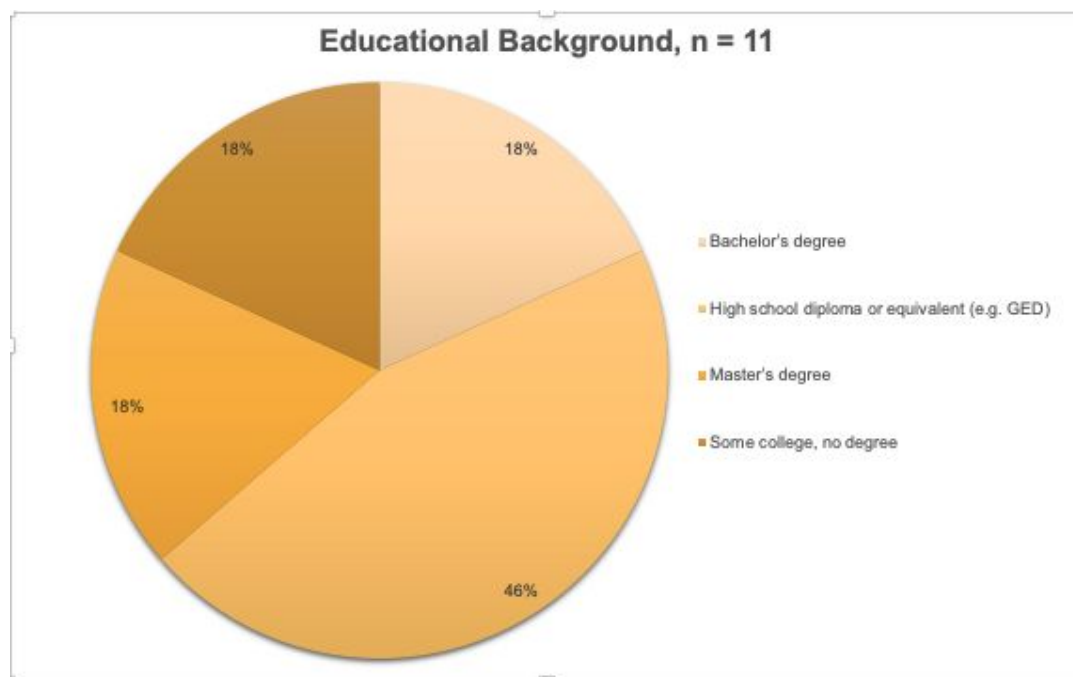


Figure 12. Participant educational background.

APPENDIX K: Screenshots of Project

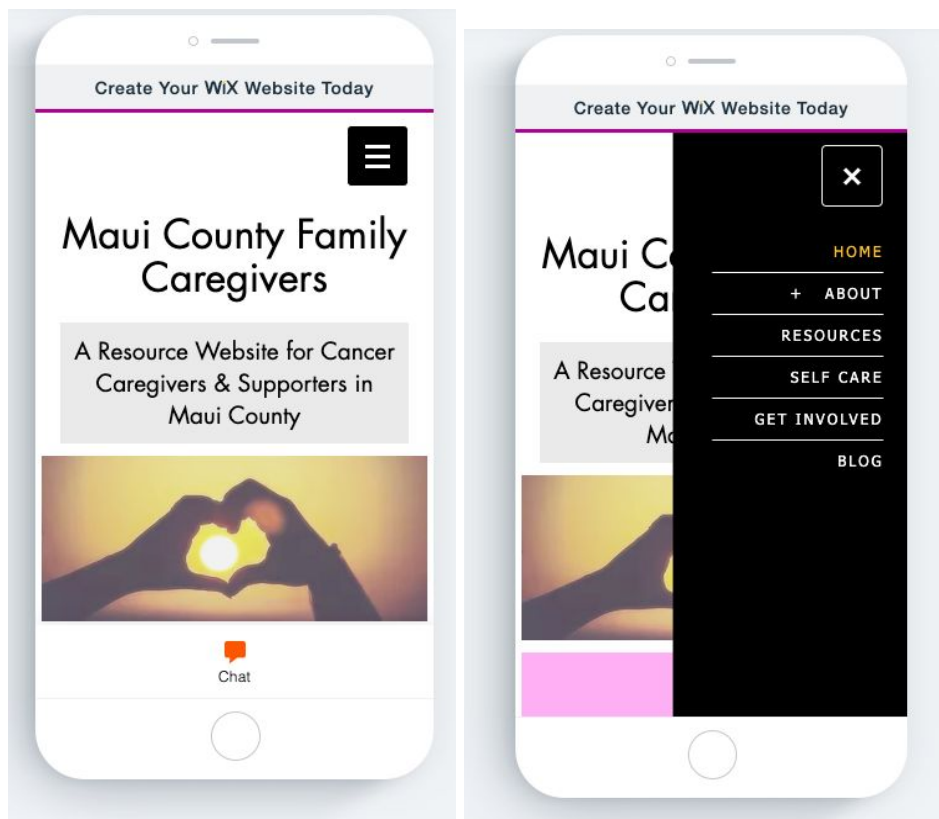


Figure 12. Prototype 2 mobile iteration.

APPENDIX L: Screenshots of Project

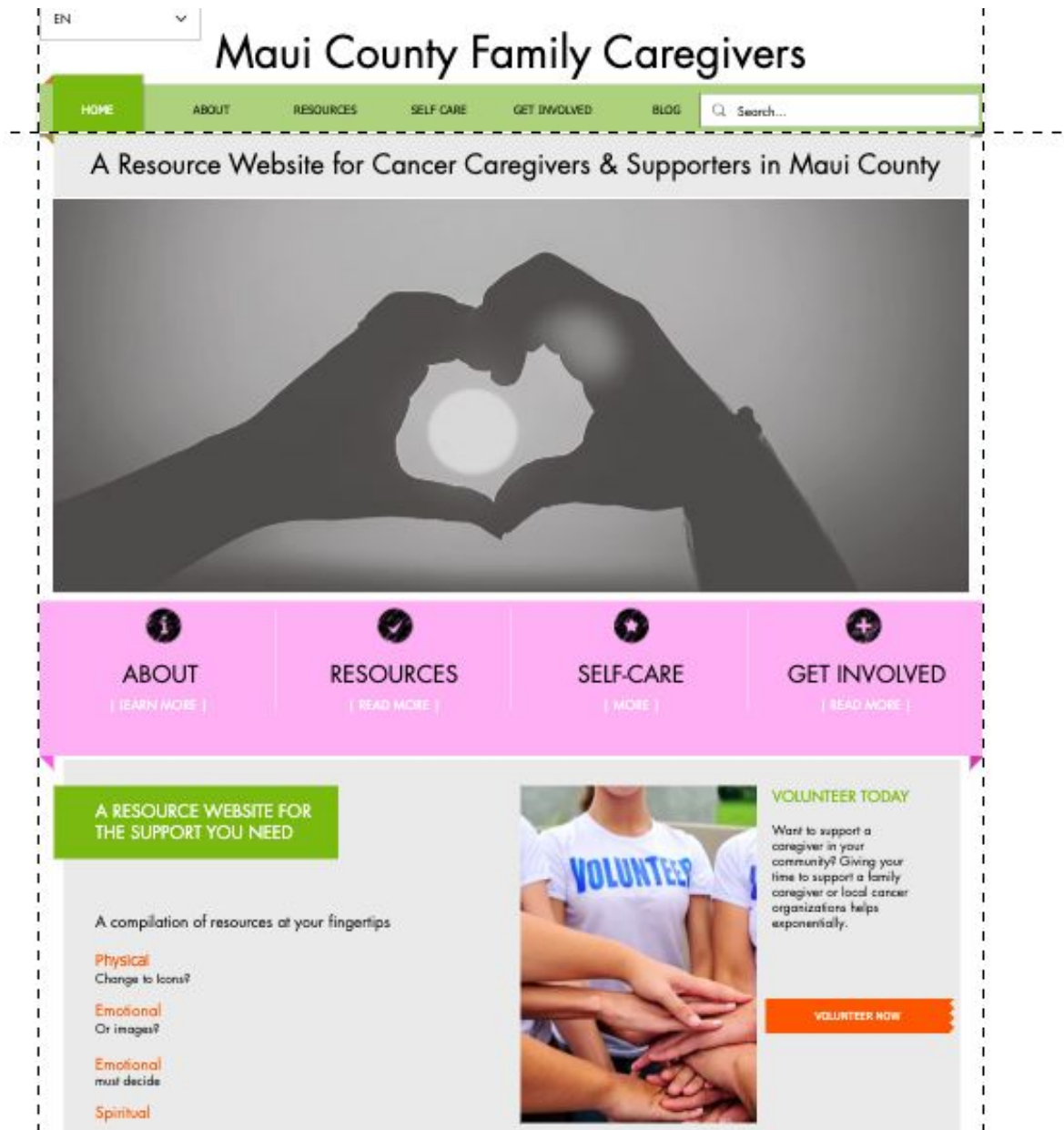


Figure 13. Prototype 2 - desktop homepage iteration.

APPENDIX L: Screenshots of Project

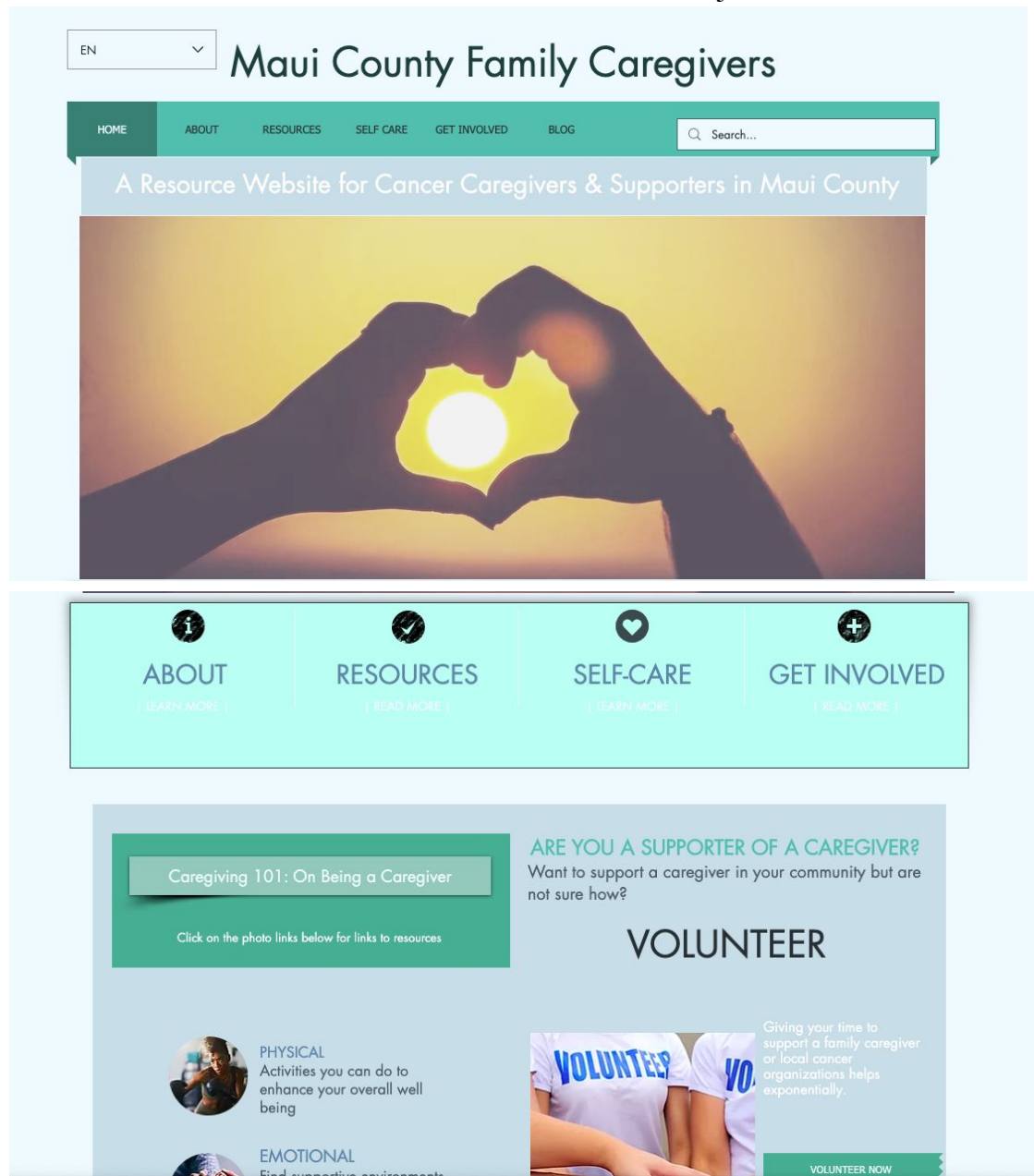


Figure 14. Prototype 3 - Desktop Homepage Iteration before Round 1

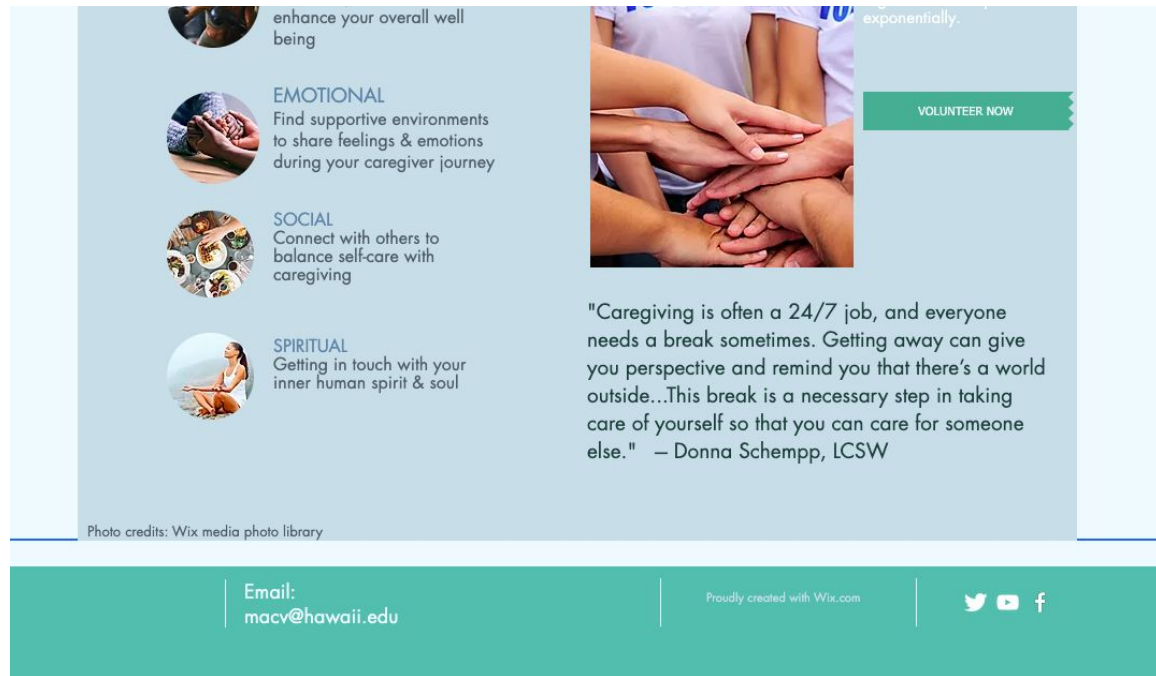


Figure 14. Prototype 3 - Desktop Homepage Iteration before Round 1

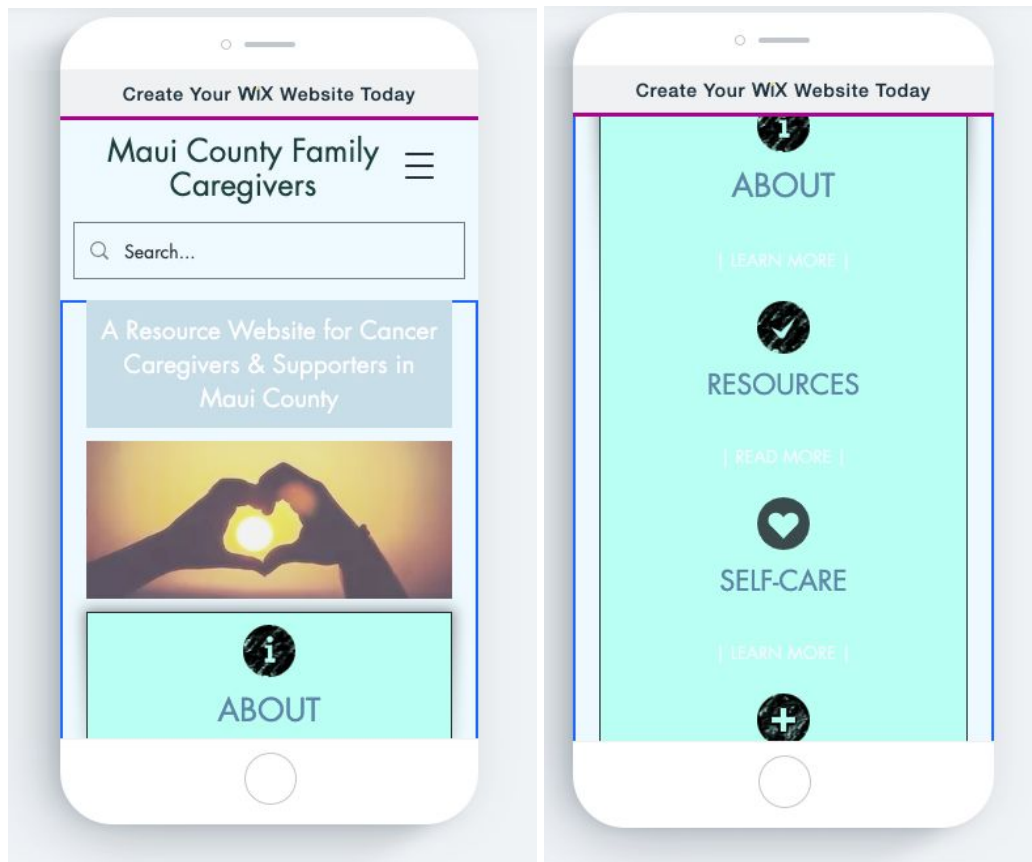


Figure 15. Prototype 3 - mobile homepage iteration before round 1.

APPENDIX L: Screenshots of Project

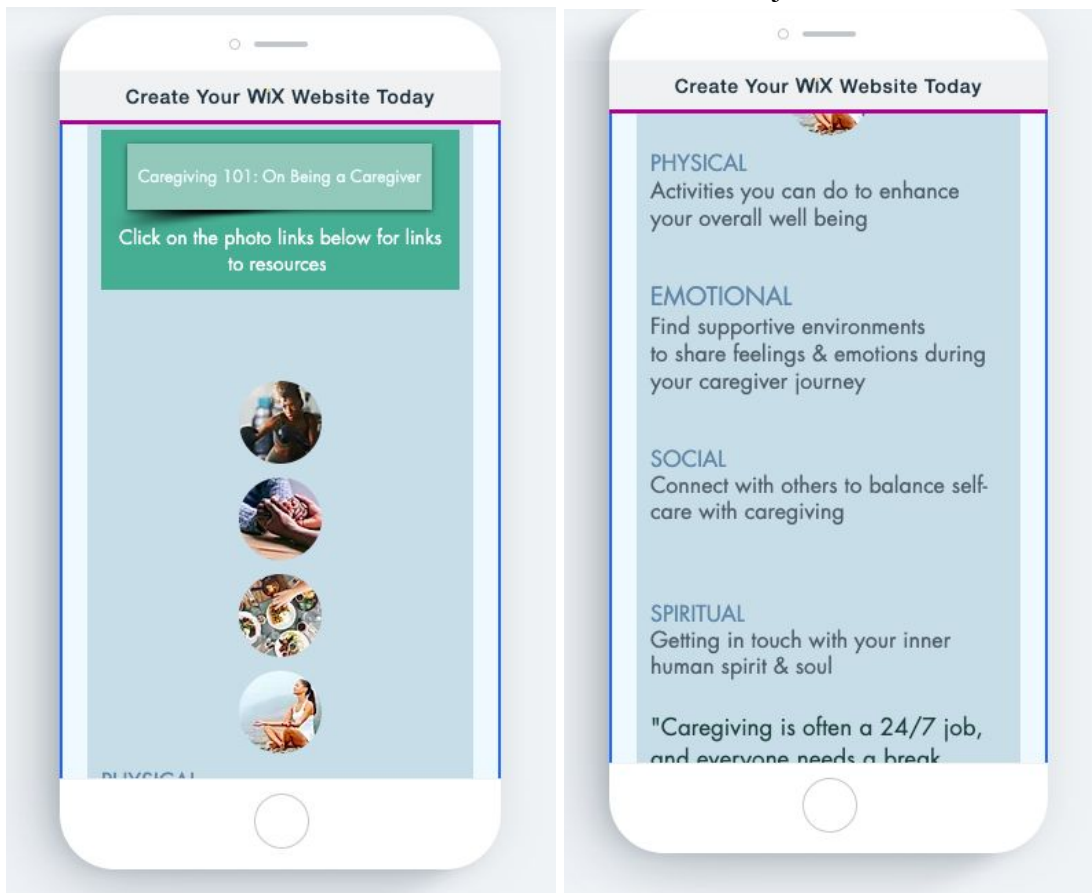


Figure 16. Prototype 3 - mobile homepage iteration before round 1.

APPENDIX L: Screenshots of Project

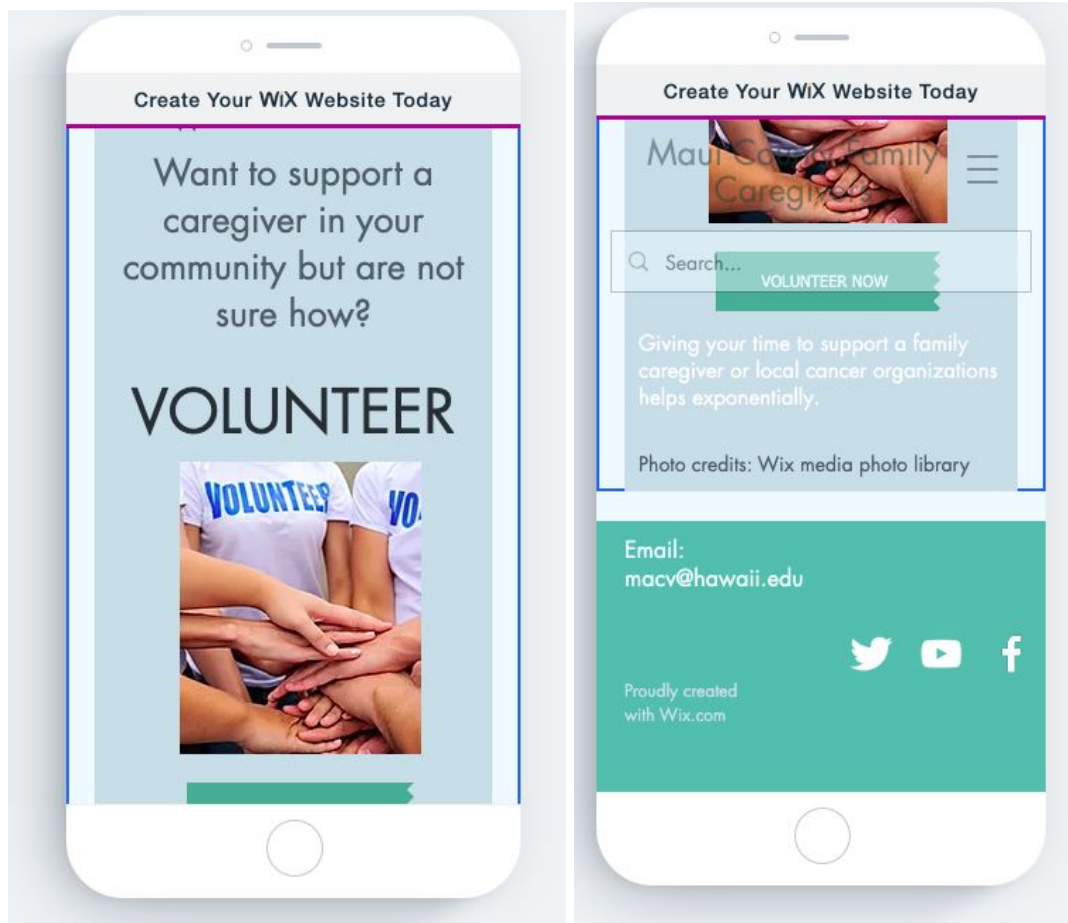


Figure 17. Prototype 3 - mobile homepage iteration before round 1.

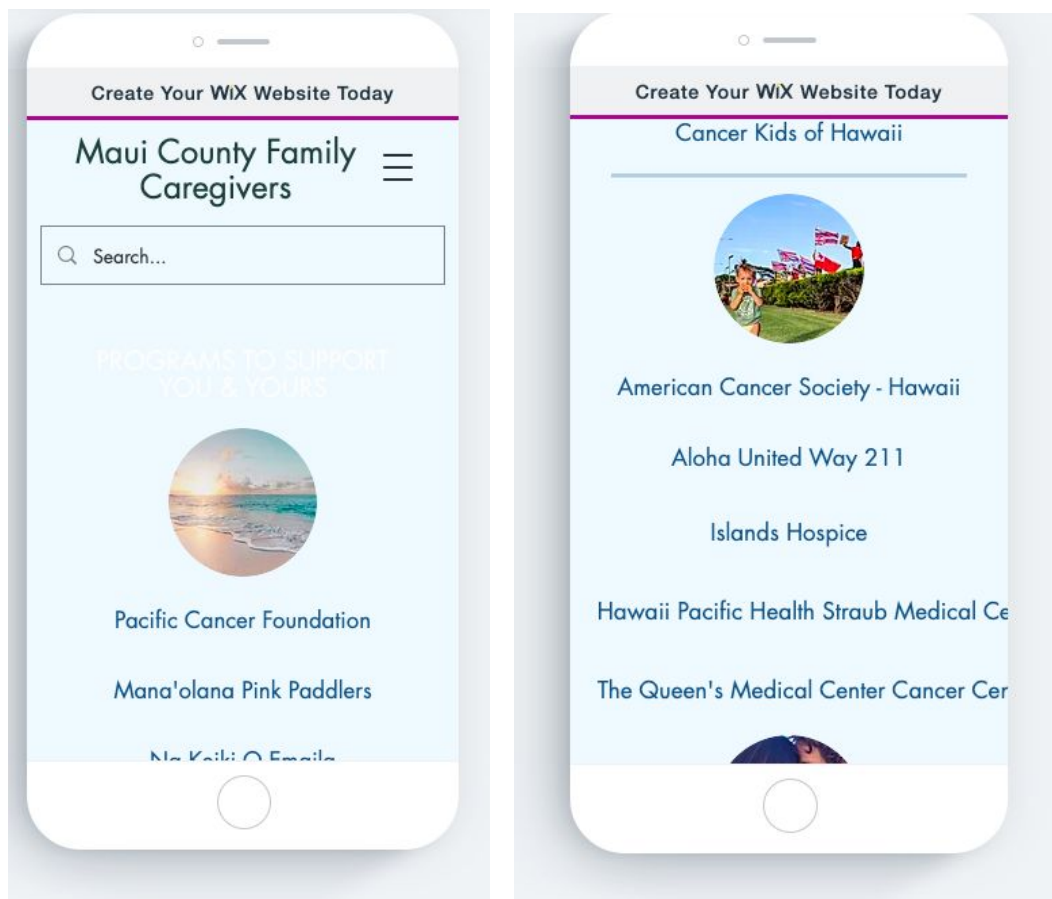


Figure 18. Prototype 3, mobile iteration before round 1, Resources page.

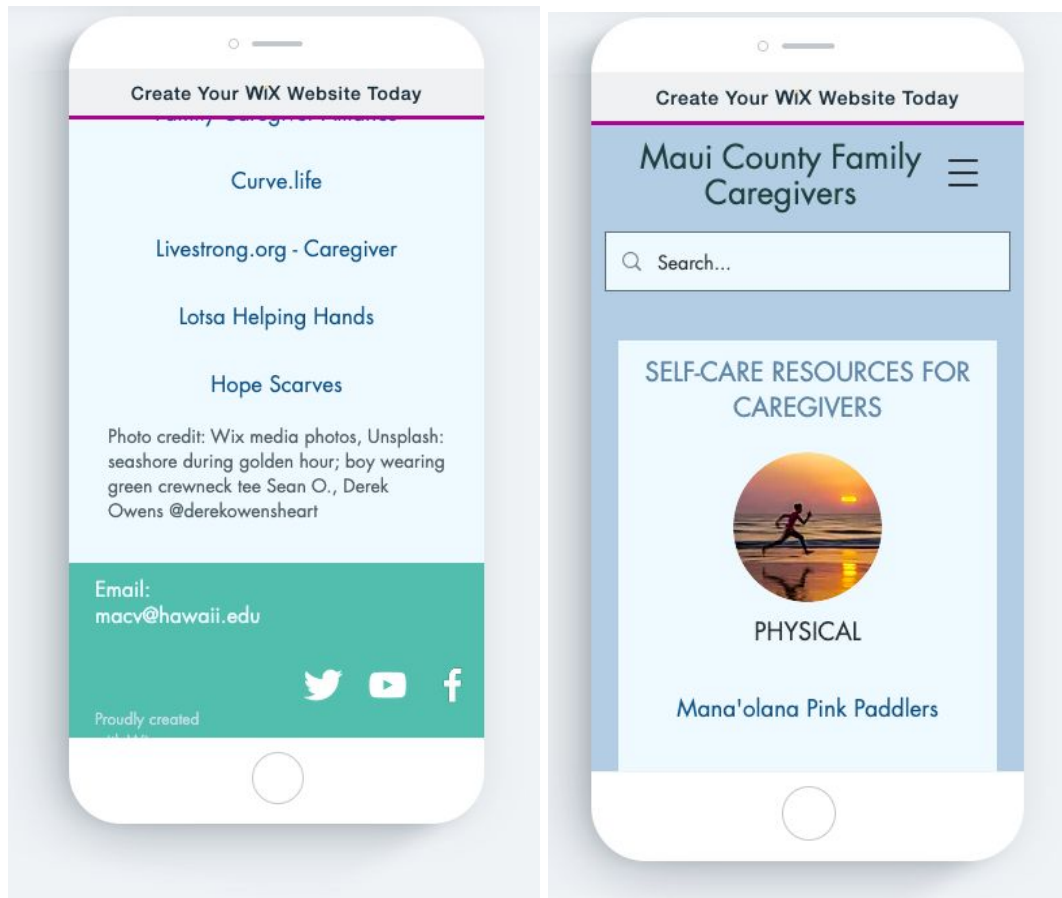


Figure 19. Prototype 3, mobile iteration before round 1, Resources pages.

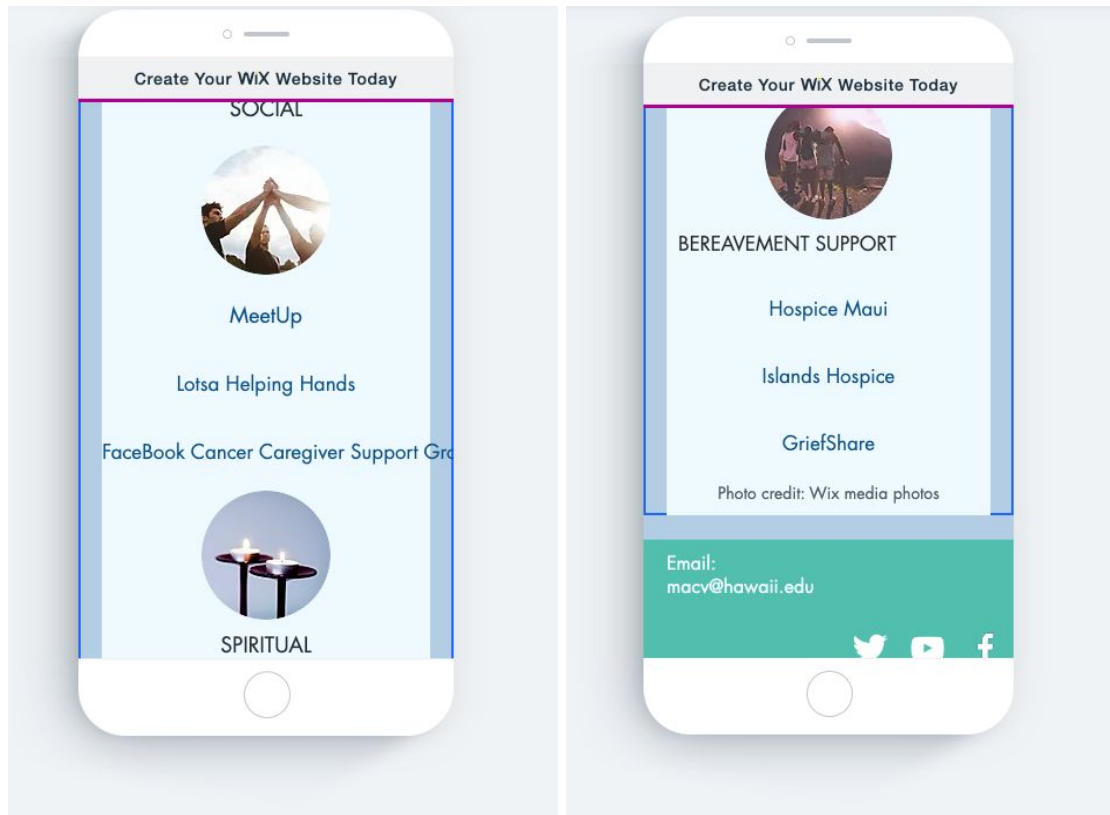


Figure 20. Prototype 3, mobile iteration before round 1, Resources pages.

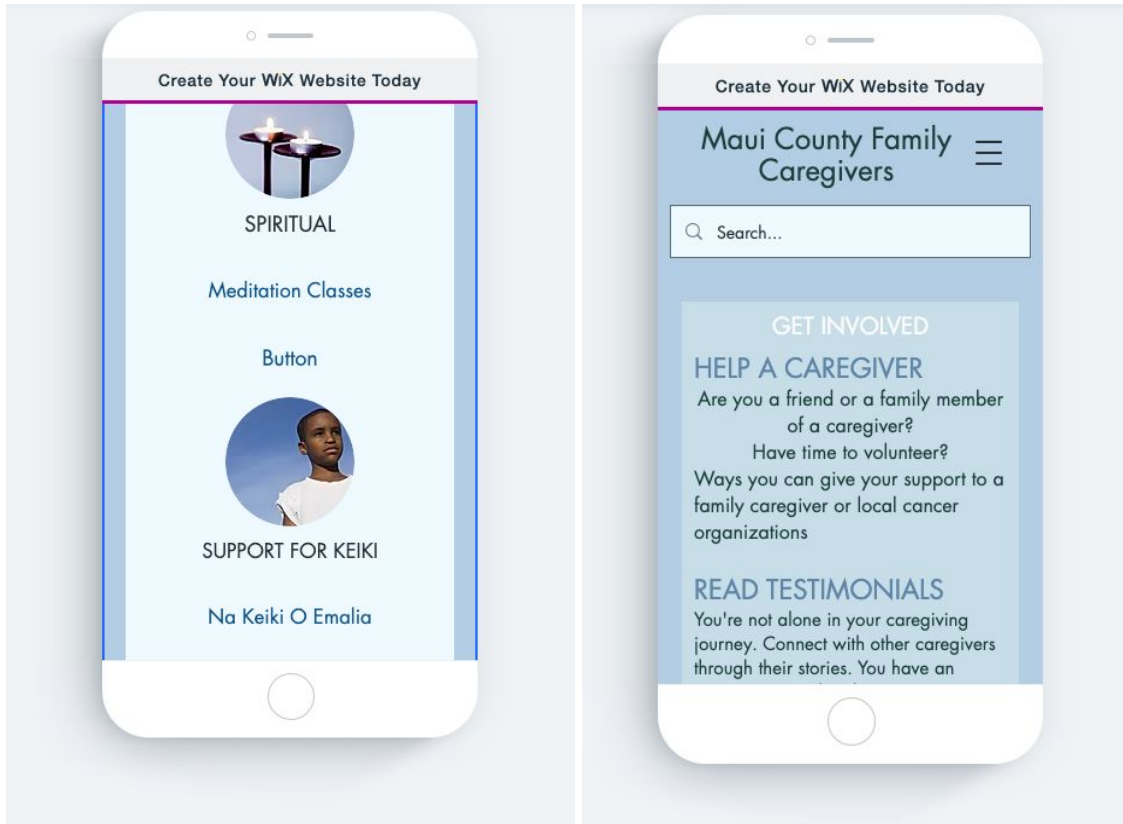


Figure 21. Prototype 3, mobile iteration before round 1, Resources pages.

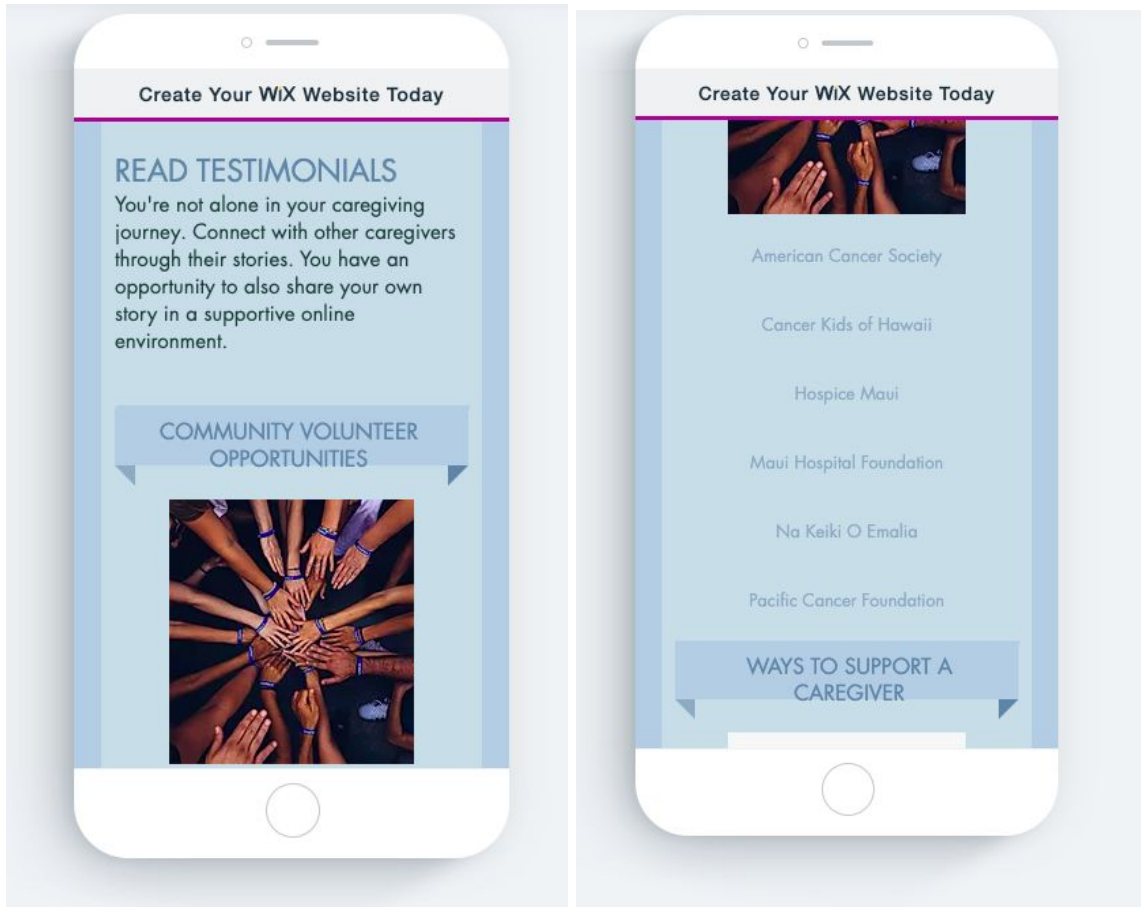


Figure 22. Prototype 3, mobile iteration pre-round 1, Resources and Get Involved pages.

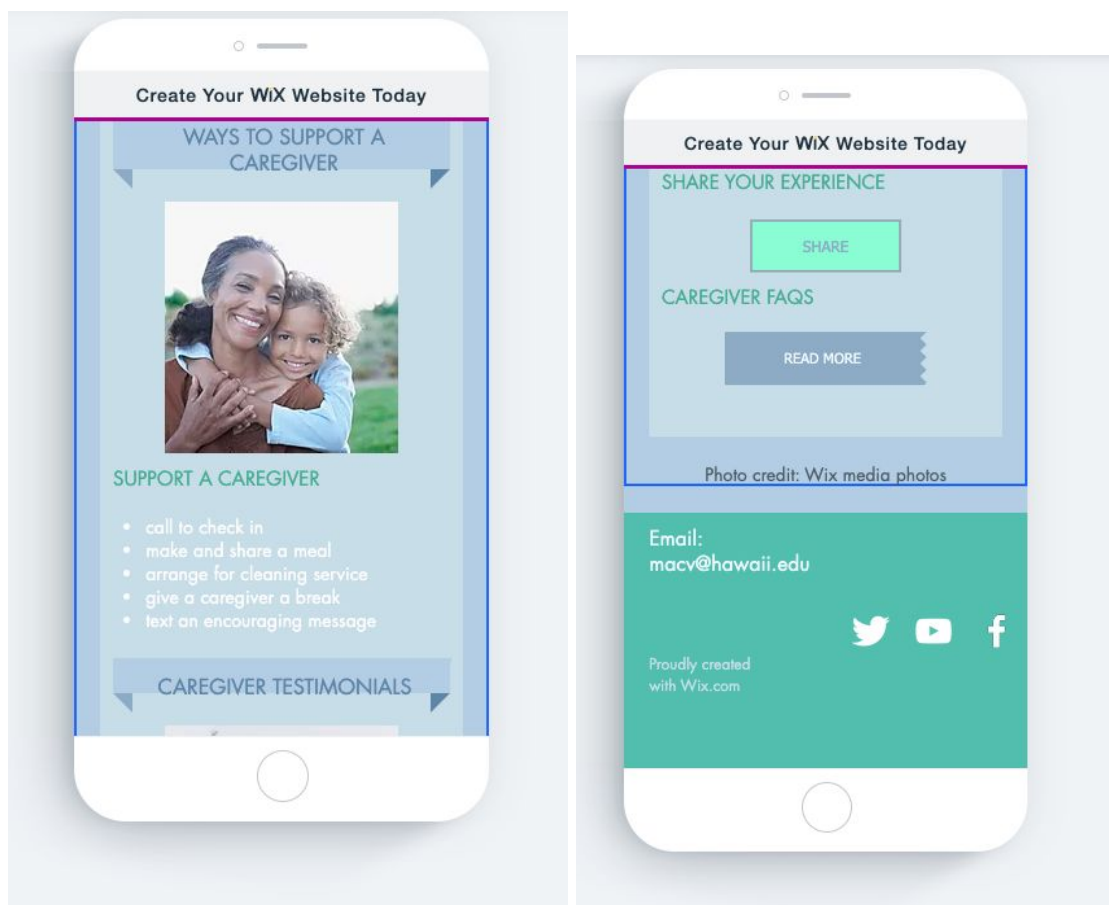


Figure 23. Prototype 3, mobile iteration pre-round 1, Get Involved page.

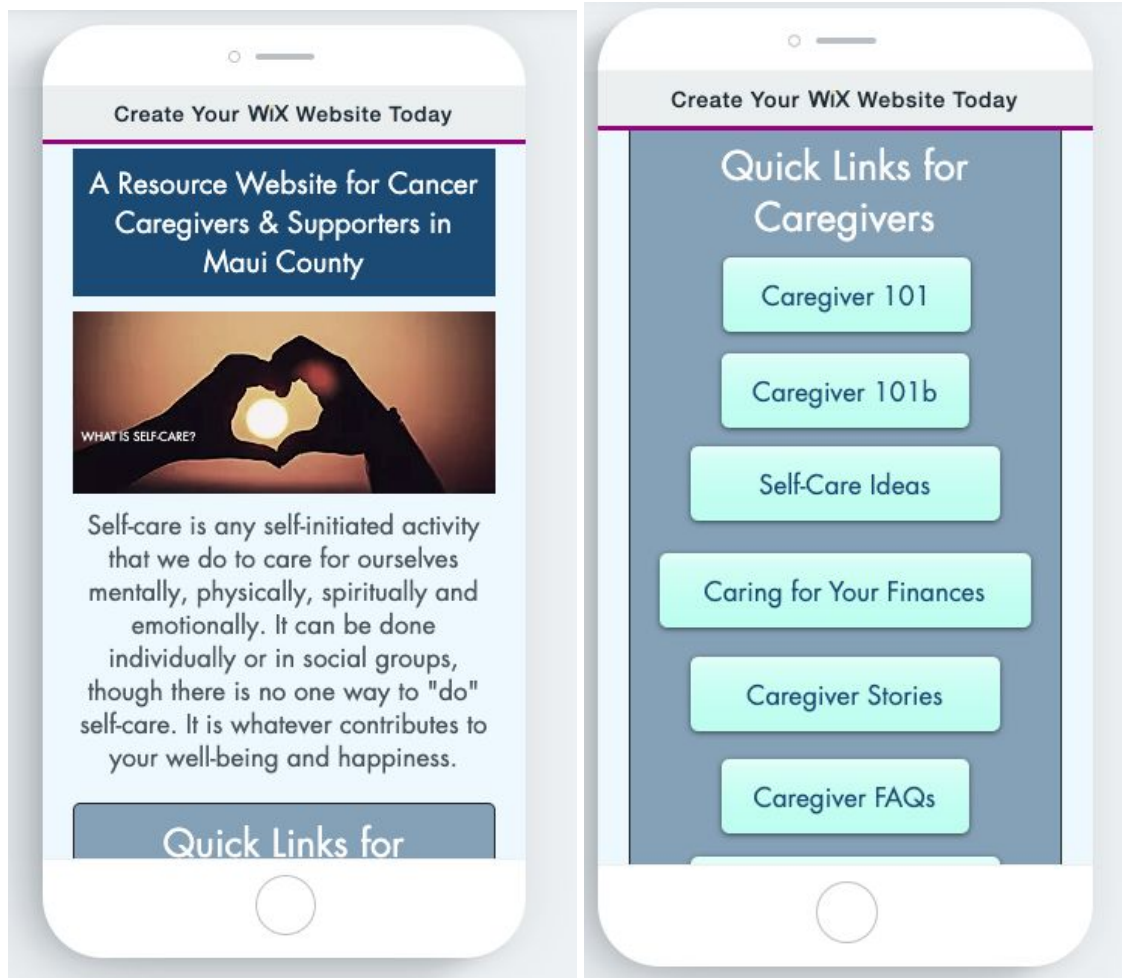


Figure 24. Current iteration, Home page.

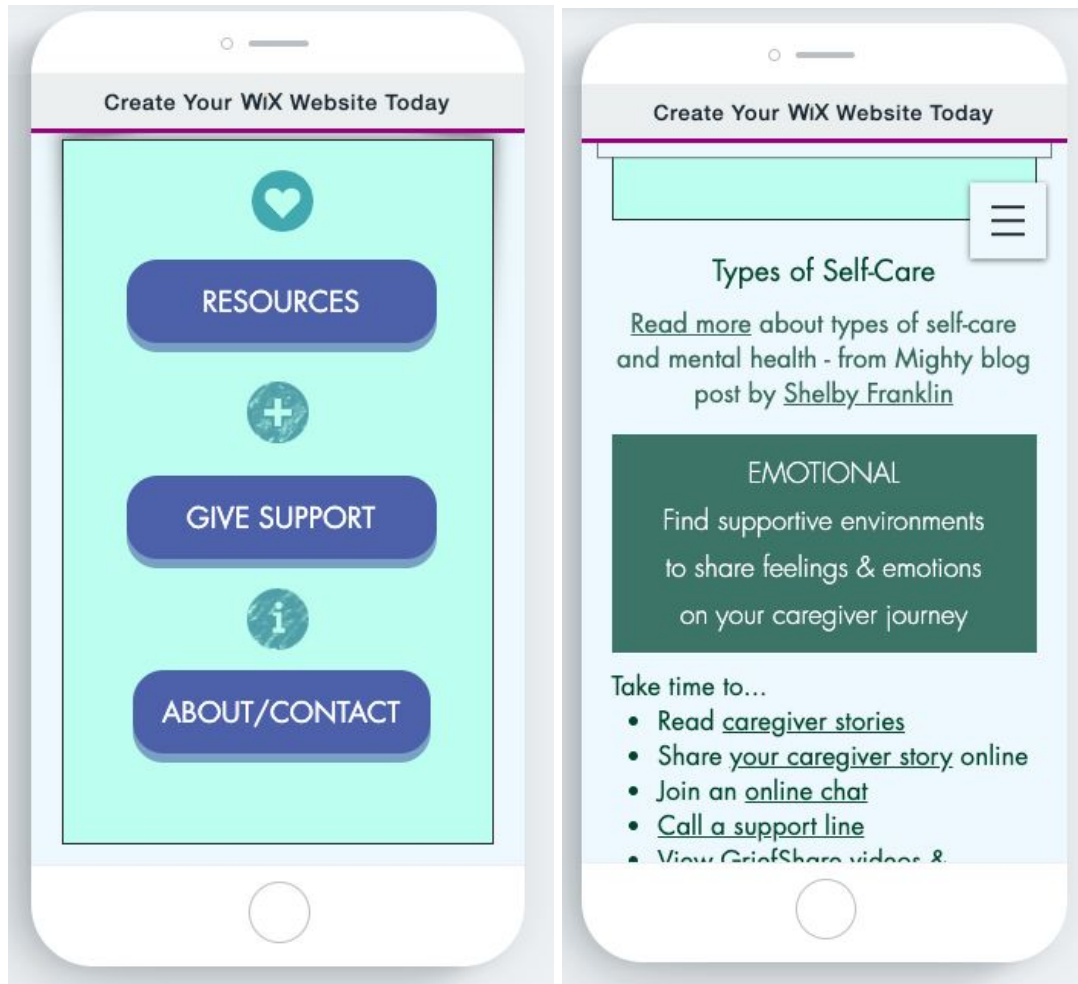


Figure 25. Current iteration, Home page.

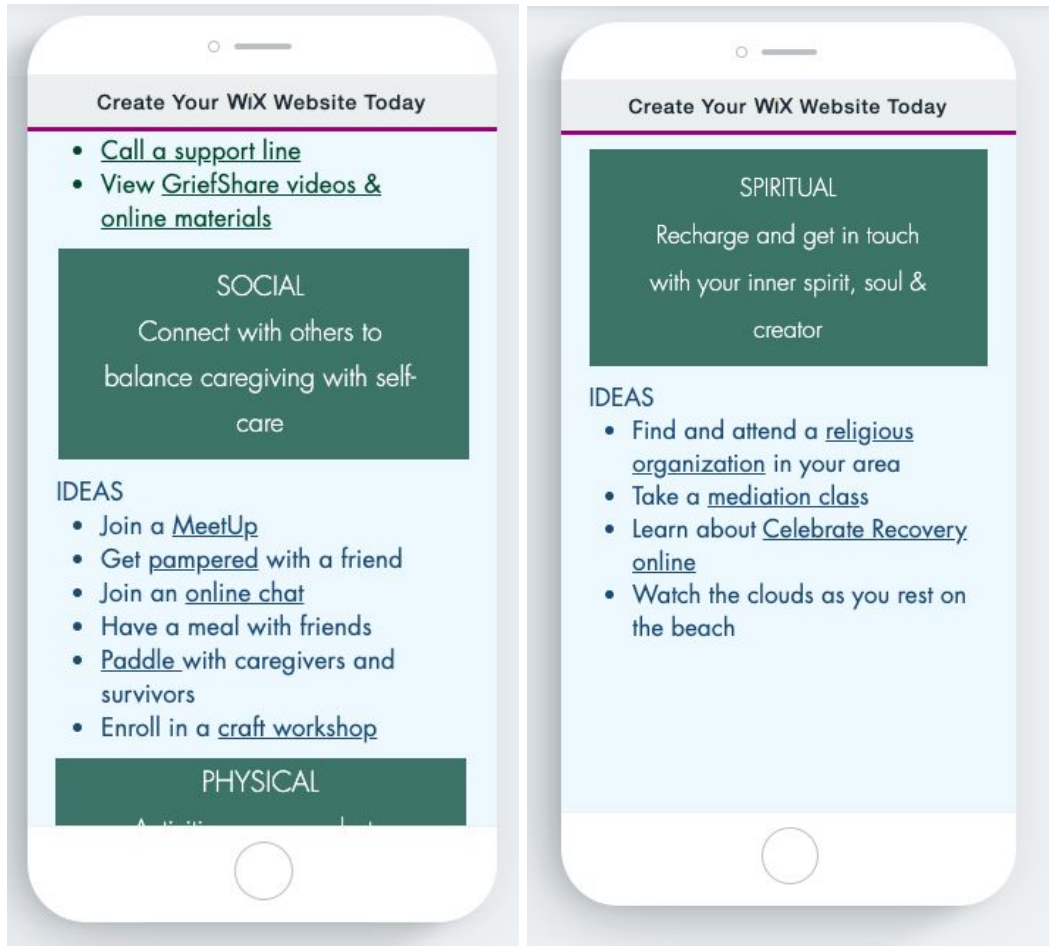


Figure 26. Current iteration, Home page.

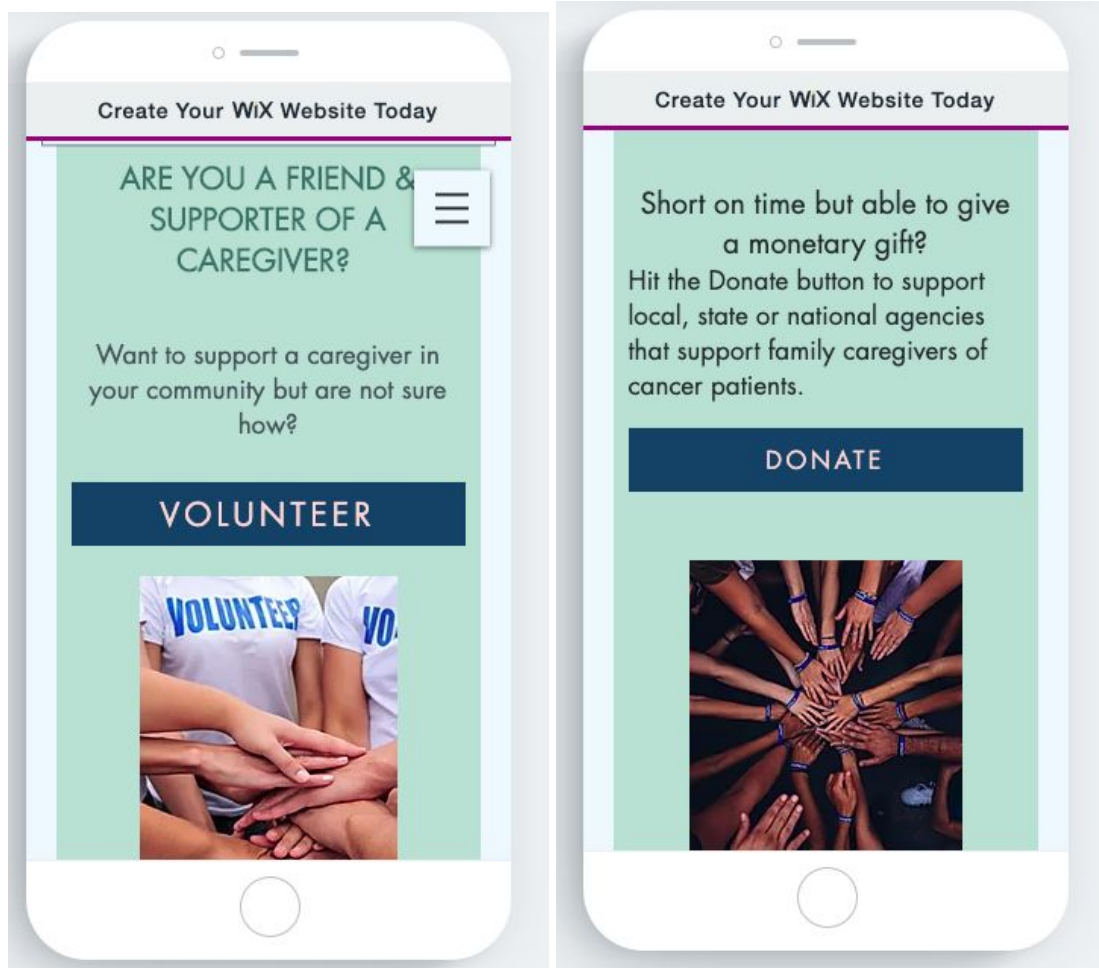


Figure 27. Current iteration, Home page.

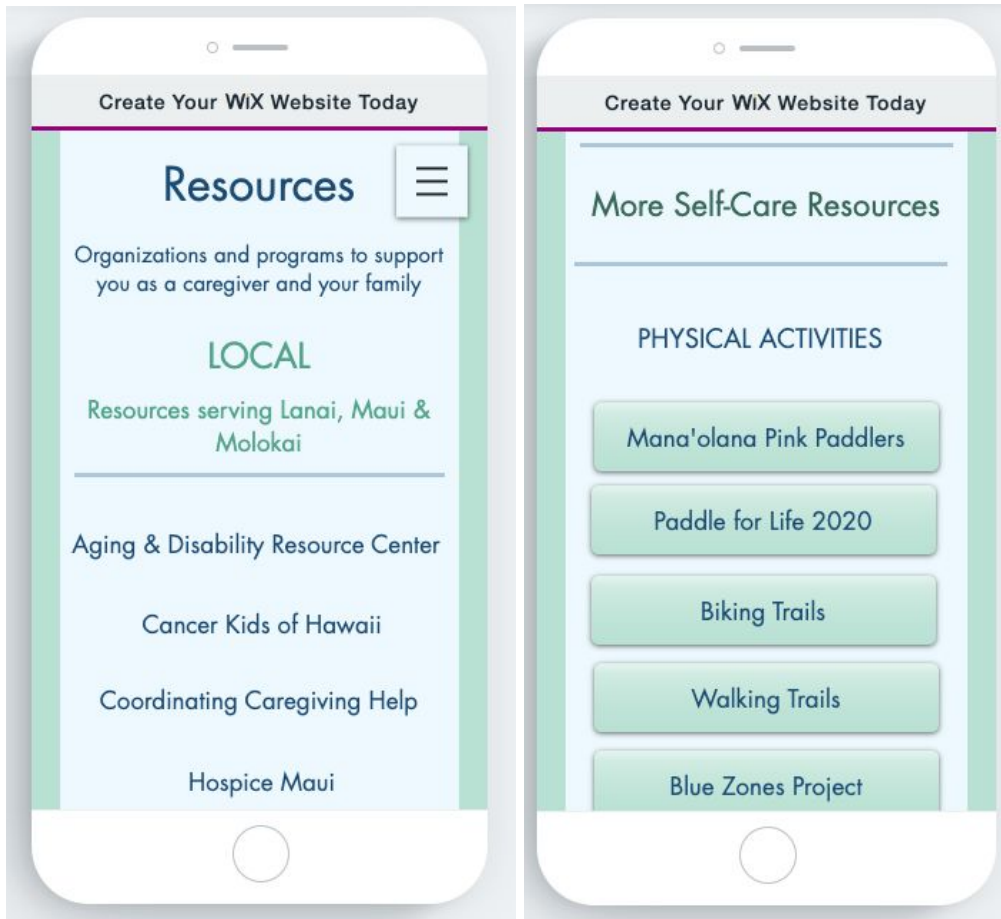


Figure 28. Current iteration, Resources page.

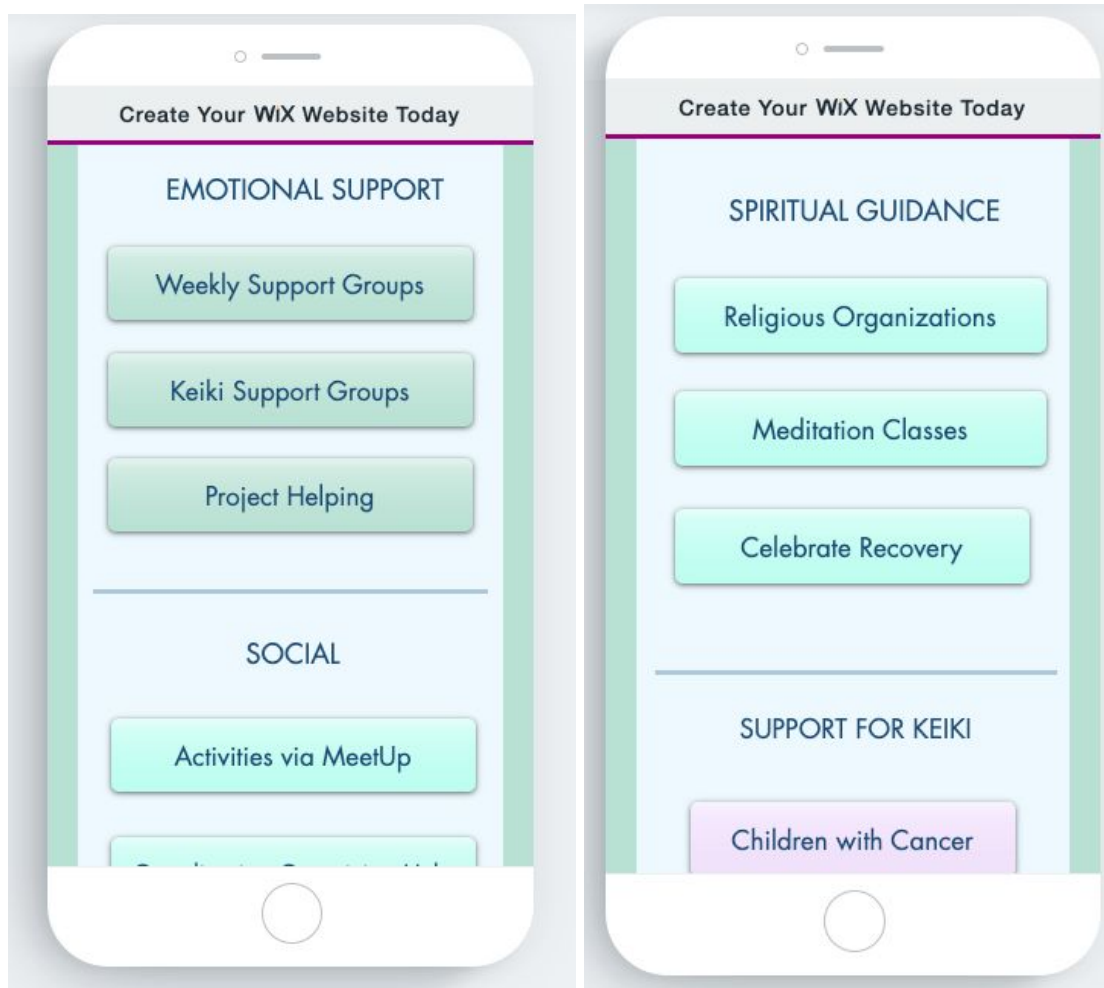


Figure 29. Current iteration, Resources page.

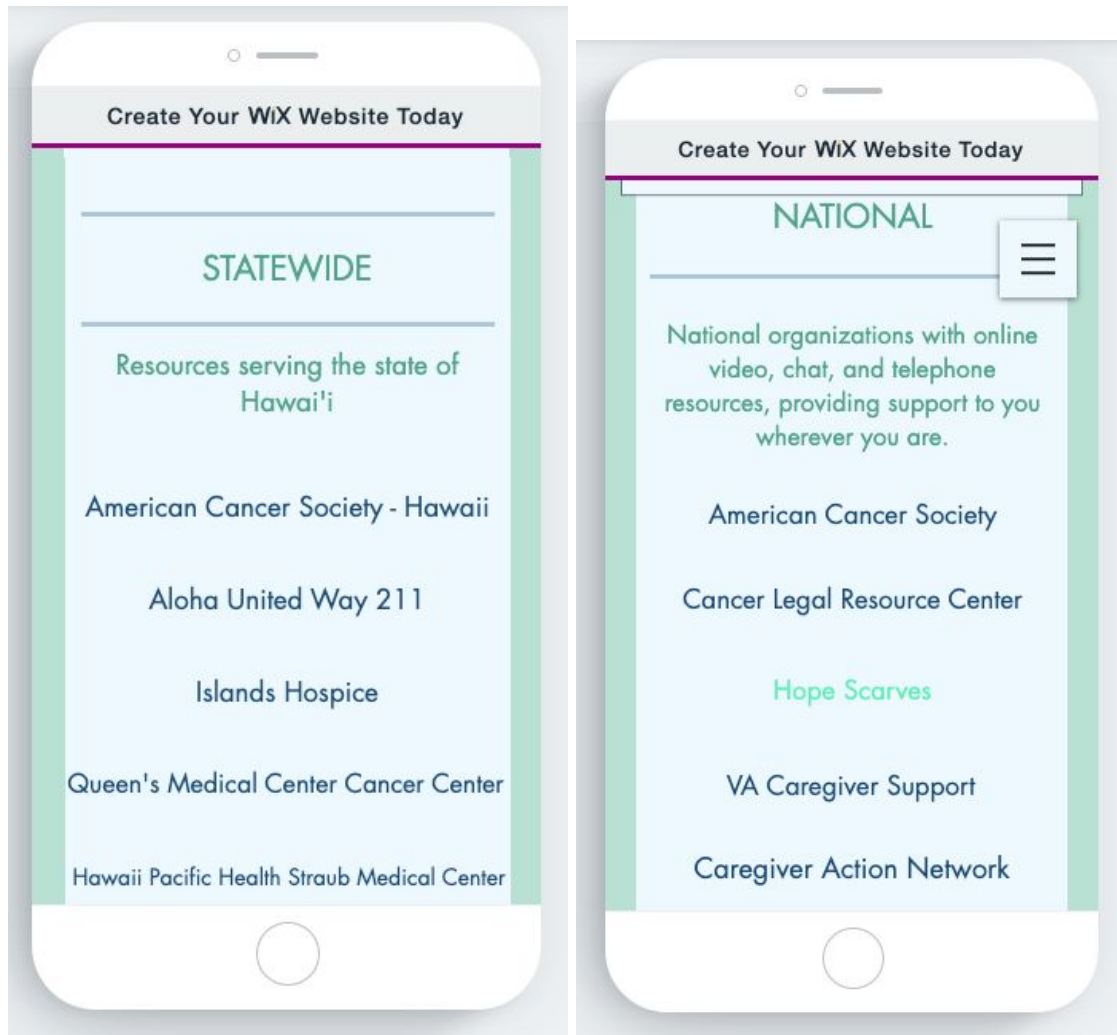


Figure 30. Current iteration, Resources page.

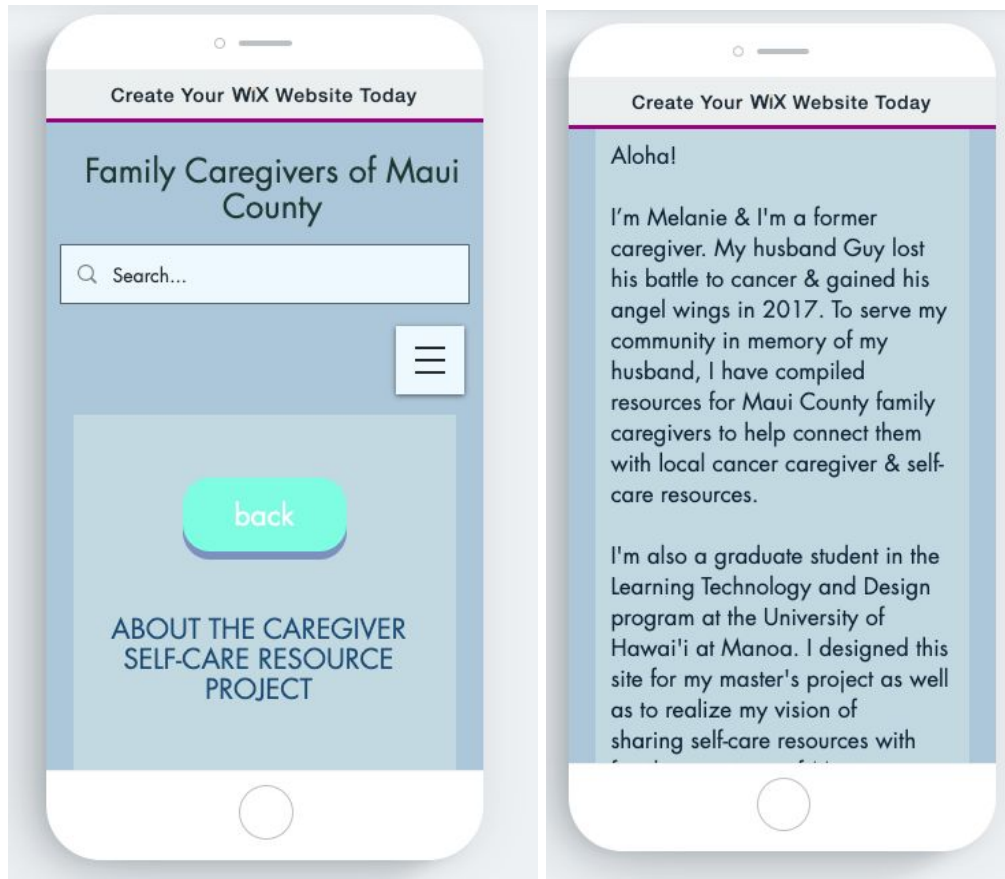


Figure 31. Current iteration, About & Contact page.

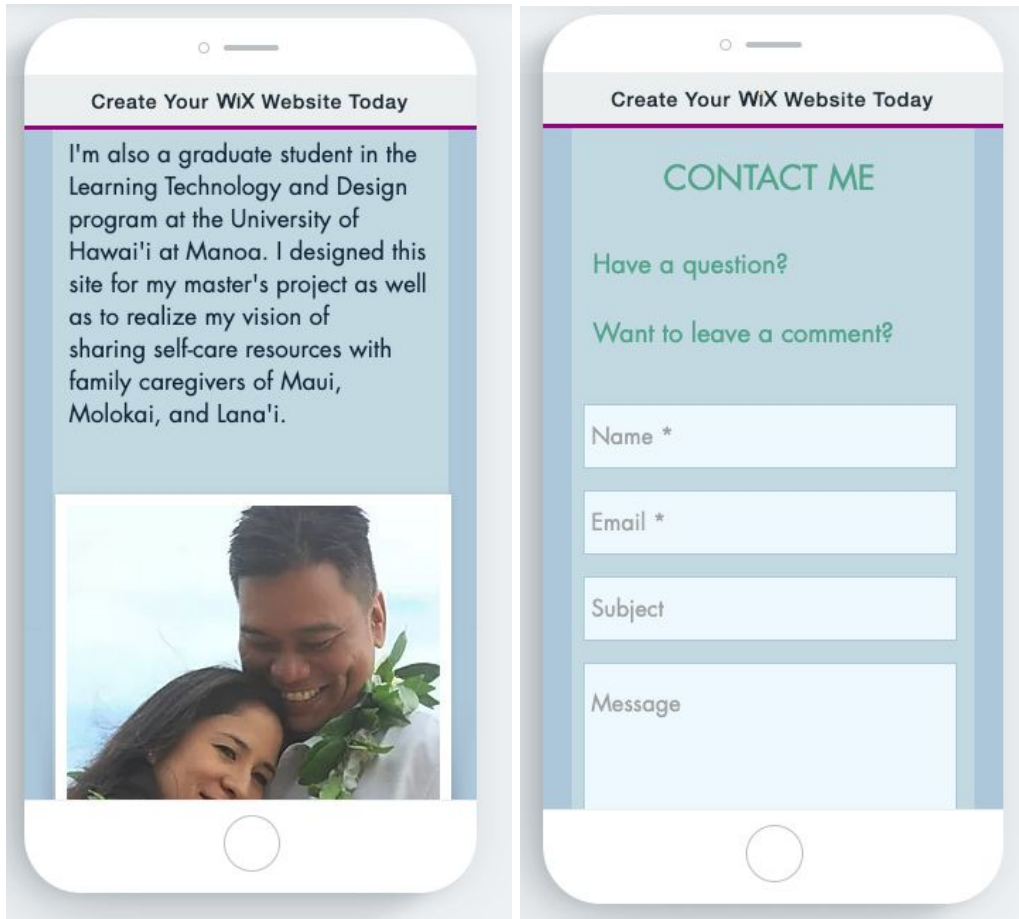


Figure 32. Current iteration, About & Contact page.

APPENDIX L.: Explanatory Diagram

Table 6

Self-Care Resource Website Usability Project Goals and Timeline

Date	Task
October	<ul style="list-style-type: none"> • Begin writing detailed project plan. <ul style="list-style-type: none"> ◦ Define goals for the study ◦ Write tasks that match the goals of the study ◦ Write the evaluation protocols ◦ Decide on collecting metrics • Begin the IRB approval process. • Create a wireframe based on the content map <ul style="list-style-type: none"> ◦ informal feedback/test with SMEs ◦ revise wireframe based on feedback • Refine research questions and task-based scenarios • Create usability game plan
November	<ul style="list-style-type: none"> • Continue design and building website, version 1 <ul style="list-style-type: none"> ◦ informal feedback/test with SMEs ◦ revise prototype based on feedback • Continue refining and revising literature review • Pre-Test goals with Critical Friends group
December	<ul style="list-style-type: none"> • Finalize project plans for approval via UH IRB • Finalize project website prototype
January	<ul style="list-style-type: none"> • Upon IRB approval begin project implementation. • Conduct the usability study with participants <ul style="list-style-type: none"> ◦ Recruit participants ◦ Consent forms ◦ Conduct Round 1 of Usability Test ◦ User Interviews for Feedback ◦ Analyze feedback ◦ Compile feedback and produce metrics
February	<ul style="list-style-type: none"> • Make revisions to website, version 2 • Conduct Round 2 of Usability Test • User Interviews for Feedback • Analyze feedback <ul style="list-style-type: none"> • Compile feedback and produce metrics <p>Make Revisions to Website, version 3</p> <ul style="list-style-type: none"> • Conduct Round 3, Usability Test
March	<p>Analyze data</p> <ul style="list-style-type: none"> • Continue final paper draft
April	<ul style="list-style-type: none"> • Create TCC Presentation Slides • Conduct TCC Presentation <ul style="list-style-type: none"> • Complete final paper draft
May	<ul style="list-style-type: none"> • Complete final paper